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WRITTEN SO YOU CAN UNDERSTAND IT

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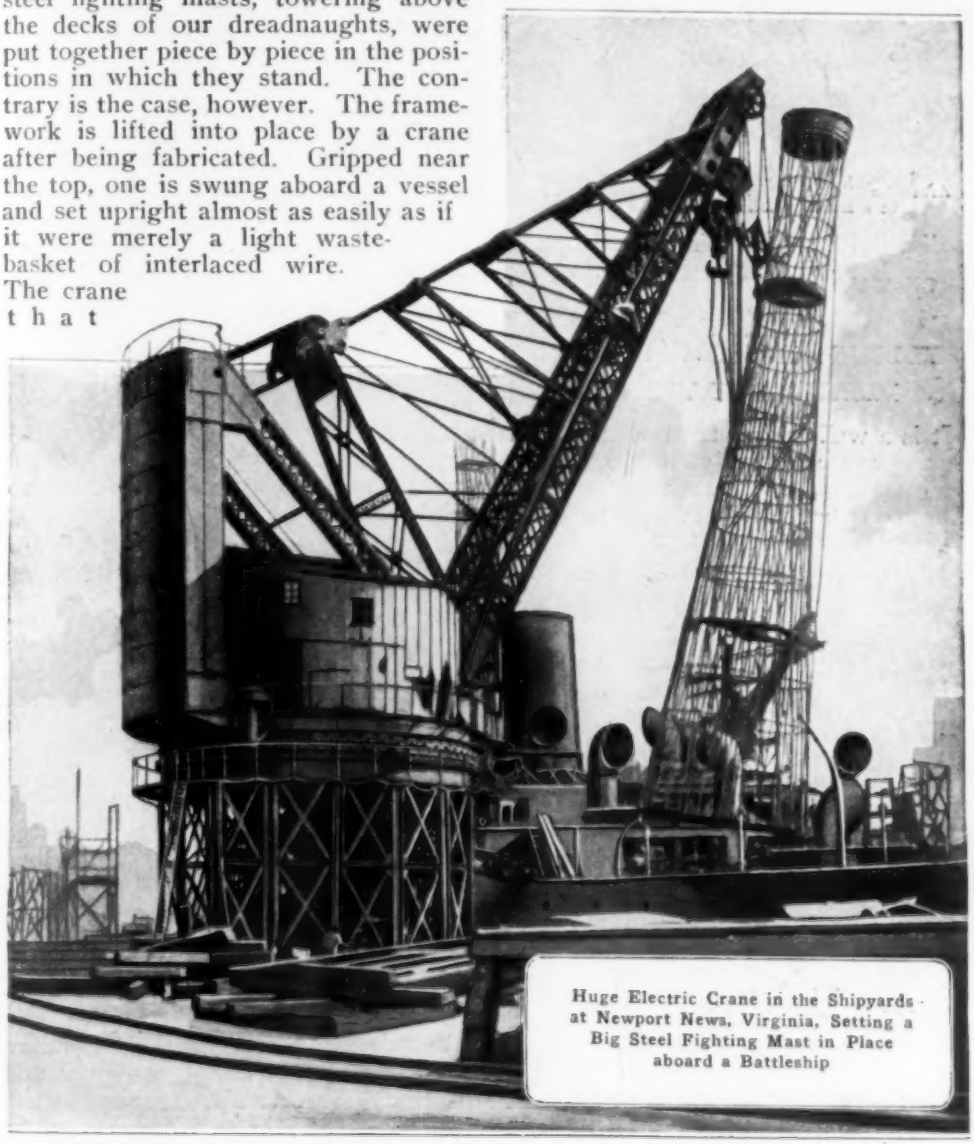
Fighting Masts Hoisted onto Ships by Crane

IF he has ever given the matter thought at all, the average person has doubtless assumed that the big steel fighting masts, towering above the decks of our dreadnaughts, were put together piece by piece in the positions in which they stand. The contrary is the case, however. The framework is lifted into place by a crane after being fabricated. Gripped near the top, one is swung aboard a vessel and set upright almost as easily as if it were merely a light wastebasket of interlaced wire. The crane that does this work is electrically propelled and under the control of a single operator.



Huge Electric Crane in the Shipyards at Newport News, Virginia, Setting a Big Steel Fighting Mast in Place aboard a Battleship

FLASH-LIGHT ATTACHMENT FOR PHONOGRAPHS

It frequently happens that while starting a phonograph in the dark or in dim light, a record is injured or the needle is so placed that the first part of the rendition is spoiled. To overcome this difficulty and yet make it unnecessary to light the room each time a new selection is put on the phonograph, a flash light is being manufactured which can be easily attached to the tone arm of any talking machine. The bulb is inclosed in a small metal reflector which concentrates all the rays on the disk. It is lighted merely by pressing the finger against a spring contact arm extending along the upper side of the attachment. One can operate it without difficulty while in the act of putting the needle in place, as the accompanying illustration shows. Extending along the tone arm are the electric wires which connect with a small battery. The latter is contained in a case that stands beside the revolving table. The amount of current used is so small that one battery will last a long time.

A Flash Light Which can be Easily Attached to the Arm of a Phonograph: It is Designed for Use in a Dark or Dimly Lighted Room

SPELLING LESSON IS MADE PLEASANT PASTIME

It is a well-known truth that a child learns more quickly through the medium of play than through dull hours of tedious instruction. To make play of work is the endeavor of almost all really successful tutors of little tots. A teacher in one of the public schools at Columbus, Ohio, some time ago found a way of making her pupils look anxiously forward for the daily spelling lesson. Her plan of teaching is a most novel one and has proved so effective that it has been adopted by other instructors in the elementary grades of the city's schools. A telegraph key and receiver are mounted on the teacher's desk. The children have been taught the Morse code and when a word is ticked off in dots and dashes they inscribe the characters on the blackboard and then translate them. Thus ".—. . —.." means "fed" to the youngsters, who find it great fun to play telegrapher. A variation of the routine is to have different children tick out the dots and dashes as words are pronounced by the teacher.

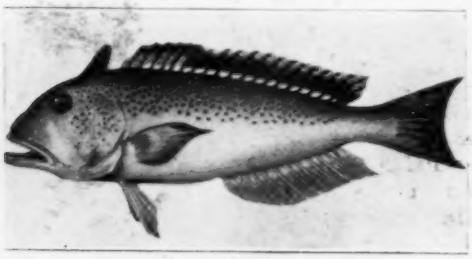
The Youngsters Set Down the Dots and Dashes as They are Ticked Off, and Then Translate Them into Letters and Words

STATUE OF LIBERTY NOW ILLUMINATED AT NIGHT

THE Statue of Liberty in New York Harbor is now illuminated at night in a most impressive manner by powerful batteries of electric lights concealed behind the walls surrounding the base of the colossal figure. There are 250 lamps of 250 watts each, arranged in groups of from 4 to 25 around the statue. Reflectors add to the intensity of the illumination. President Wilson from his yacht in the harbor formally inaugurated the lighting system by pressing the key of a wireless instrument. The next instant there was a boom of guns as the warships in the harbor fired a salute. At the same time there was a flash of flame above the statue as Miss Ruth Law, the air woman, circled it in a lighted aeroplane, adding a spectacular touch to the ceremonies. Funds for the new lighting system were raised by popular subscription.

POPULAR NEW SEA FOOD HAS STRANGE HISTORY

What is virtually a fish new to the entire human race has been introduced in many parts of the country within the last few months, largely through

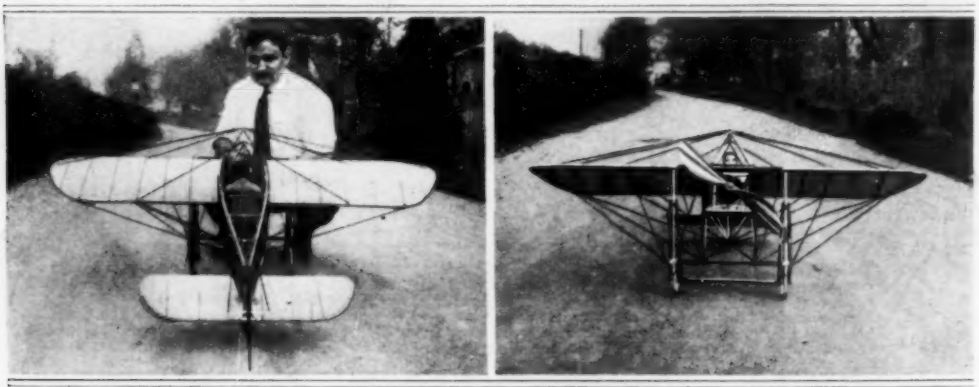


Specimen of Tilefish, an Edible Ocean Fish, Which was Only Recently Rediscovered: Its Brief History has been Marked by a Strange Tragedy

the efforts of the Bureau of Fisheries. It is known as the tilefish and is found in about 600 ft. of water close to the ocean's bottom, where it shelves off to greater depths. The fish averages perhaps 30 in. in length, is beautifully colored, can be caught rather easily, and has a fine flavor. Remarkable circumstances characterize its brief history. So far as is known, the first time any human being ever saw this fish was in 1879, when a captain of a fishing schooner by chance caught several thousand pounds of the strange ocean dwellers. After that discovery many other catches were made. Then in 1882, without warning, hundreds of millions of these fish, dead and dying, were found floating on the surface of the ocean. It is reliably reported that the area covered by them was 170 miles long and 25 miles wide. It is believed that a change in the course of the Gulf Stream may have chilled the tilefish so that they were all but exterminated. For years little was heard of them. A short time ago it was found that the species had greatly multiplied. As a result of a systematic campaign to inform the American public about this strange fish, a large and profitable tilefish trade is being built up in many parts of the United States, and it is on the menus of the best hotels.

FIVE-FOOT MODEL OF BLERIOT'S PLANE

A tiny reproduction of the monoplane in which Blériot made his first flight across the English Channel has been built by a resident of Philadelphia, who is of French birth. The model measures 5 ft. long, 5 ft. wide, and 2 ft. high, and weighs 8 lb. without the motor. The materials used are steel, aluminum, and silk, and cost $225. The machine is constructed in the same manner as a large monoplane is and can be taken apart and reassembled easily. The wheels are provided with ball bearings and rubber tires. All of the parts, save the electric motor and the propeller, were made by the owner, who gave much of his spare time to the task for five years.



Two Views of a Model of the Monoplane in Which Blériot First Crossed the English Channel: The Machine Is Five Feet Long and Five Feet Wide and Weighs Eight Pounds without the Motor

AGED PERSONS GIVEN WORK BY GOTHAM ASSOCIATION

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These Old Men—Every One of Them a Cheerful, Willing Craftsman—Make Toys in the Association's Workshops for a Small Daily Wage

Soaring prices of foodstuffs and other necessities of life have greatly increased suffering in the slums of our big cities. Partly for this reason, partly for others, the work that is being done at New York by a philanthropic association, organized for bettering the lot of those who are needy and destitute, has come to public notice. Through the efforts of this body, old men and women are given clean, respectable work that pays them little in money but much in hope and well-being. Markets have been opened where poverty-ridden persons can obtain provisions at the lowest possible prices, while kitchens have been established at which cooked foods are sold almost at cost. Toy making is one of the occupations opened to a large number of aged men, while sewing offers many women profitable employment. These needy old people are not bound by strict factory rules, or expected to make slaves of themselves. They do the best work they can and as much as they are able, accepting in return a moderate wage.

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Women Who Need Employment and Otherwise would Be Idle and Possibly Destitute are Given an Opportunity to Earn with Their Needle

DEVICE RECORDS LOCATION OF NEAR-BY SHIPS IN FOG

A device, which by means of wireless and sound waves will detect the presence of a neighboring vessel in a fog and record its location and course, has been constructed by a New York inventor. If the invention proves in practical experience to be capable of all that it promises, it means that the grave dangers which threaten all vessels in foggy weather can be greatly lessened. The instrument is operated by signals sent out simultaneously from the foghorn and the wireless apparatus of a neighboring ship. Hence, to be effective, all ships would have to be equipped to give the proper warnings. The principle on which the invention is based has to do with the difference in time it takes a wireless signal to travel a given distance and a foghorn signal to travel the same distance.

The instrument consists of a flat circular case, inclosing 16 endless belts so placed that they radiate from the center. They are operated by clockwork, and mounted on each are two pens or tinting points, so placed that when a belt begins to move, the two pens travel in opposite directions. The clockwork is adjusted so that a wireless signal from another boat will start all the belts moving, carrying 16 pens toward the circumference, while the other 16 are returning toward the center. When the sound of the foghorn arrives, which is some seconds after the belts have been started by the wireless signal, one, or perhaps two, pens will dot the disk of paper which fits in the top of the instrument. The pen or pens which are actuated to make this record are only those directly in line with the path which the sound has traveled. The dot or dots show approximately the position of the neighboring ship, while the center of the paper disk represents the position of the vessel carrying the instrument. The circular chart is marked with concentric circles, spaced according to a scale of miles based on the rate at which sound travels and the rate the belts travel. For practical purposes it is assumed that wireless signals are transmitted instantaneously.

Sixteen telephone transmitters placed along the ship's contour, each connected electrically with a corresponding belt, are the instruments which make the pens register as described above. Each receiver is so constructed that it responds only to sounds originating within a limited sector. For this reason signals from directly ahead will be recorded only by the pen traveling toward the bow, and signals from the right side, by the pens traveling in that direction, and so on. After a neighboring ship has given two or three signals, it is easy to ascertain its position, course, and the rate at which the two ships are approaching or receding from each other.

COMBINATION STEEL BOWL, HELMET, AND DIGGER

A steel helmet, which can also be used as a trench digger or as a mess bowl, has been invented by a former soldier in the United States Army. It weighs less than two pounds, and yet is strong enough to furnish protection from the smaller missiles that work so much destruction in modern warfare. The headpiece is shaped like a sugar scoop and is worn over a hat, with the pointed end at the back and the handle in front. The invention has been submitted to the ordnance board of the army.

POWERFUL TRENCH DIGGER AT WORK IN FIELD

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HEREWITH are presented two views of one of the French army's big trench-digging tractors in action somewhere along the western front, doing the work of hundreds of men. It creeps slowly ahead, cutting a ditch of the desired depth and throwing up a mound of loose earth on either side, one of which is then reinforced with sandbags and quickly made a substantial parapet. Apparatus of similar type has for years been used to dig trenches for sewers, water mains, and telephone conduits in our city streets. The point of interest lies in the way the machine has been assembled to meet the needs encountered on the battle field.

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CONCRETE-ROAD BUILDERS SPARE CENTURY-OLD ELM

When the builders of a concrete highway between Elmira, N. Y., and

Century-Old Elm, in the Center of a Highway: Concrete-Road Builders Decided to Widen the Pavement at This Point Rather than Cut Down the Magnificent Specimen

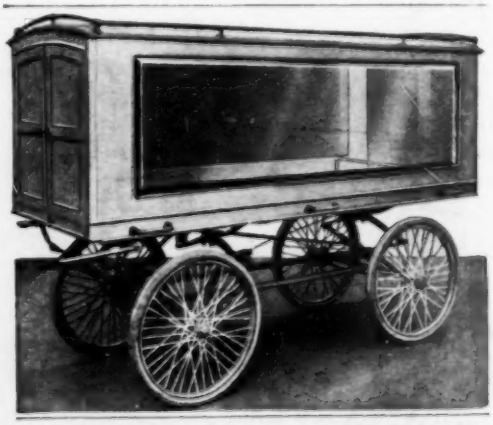
Mansfield, Pa., had progressed to a certain point they were confronted with a magnificent elm growing squarely in the middle of the road. An exception was made to the usual practice in such cases, and it was decided to let the tree stand. Consequently the road was widened to about double its regular width and laid either side of the beautiful specimen. Provision was made also for the growth of the roots in future years. The tree is said to be 100 years old.

MOTORISTS ARE PUZZLED BY NOVEL TRAIL

As an amusement for visiting motorists a novel roadway, or trail, has been constructed at a Florida resort. It is built of lumber and palmettos, and is somewhat of the nature of a labyrinth or maze. To drive into the trail in an automobile is easy enough, but to get out again is a puzzle for expert drivers as well as novices. There are blind passages and obstacles to block the way unless the proper course is taken, or one may find oneself driving in a circle or taking a back track without getting anywhere. The trail is the first of its kind reported in this country, but it is proving so popular that it will no doubt be speedily copied elsewhere, and in less attractive surroundings than the setting of palm trees and palmettos on the shore of the Gulf of Mexico.

CASKET CAR USED BETWEEN TROLLEY LINE AND GRAVE

A special car, which is pushed by hand, is now used in Hollywood, Calif., to transport a casket from the funeral car of a trolley line to the cemetery. The body has sides of beveled glass and somewhat resembles the body of a hearse. At the rear is a double door through which the casket is inserted and withdrawn. The running gear is chiefly of steel and the four wheels are rubber-tired. On either side of the car are three handles by which the pallbearers convey the vehicle to its destination. At the rear are two levers, one



Hand-Drawn Funeral Car Used in a Western City to Convey a Casket from a Trolley Line to the Cemetery

of which serves as a brake and the other as a means of steering the car. Flowers can be carried on the top.

Trapshooting as a Sport

A DEMOCRATIC PASTIME OF MILITARY VALUE

By JOHN ANSON FORD

An Alluring Sport—Trapshooting on the Beach: Young Folks Testing Their Alertness and the Steadiness of Their Nerves, Firing at Targets Thrown by a Hand Trap

WITHIN recent years what has rightly been called the most democratic of sports has been gaining in popularity so rapidly that it bids fair, before long, to supersede golf, tennis, football, and even baseball in respect to the number of persons participating in it. The pastime for which this extraordinary claim is made is trapshooting. It is estimated that there are more than 500,000 trapshooters in the United States today. Last year there were approximately 4,000 trapshooting clubs. In 1915 the number of persons who participated in what is called the "Beginners' Event," a shooting contest conducted by the Interstate Trapshooting Association, was 7,450, which is said to be equal to the number of beginners for the entire four years previous. In 1916 the number of beginners had increased to 11,040! Such is the remarkable growth which the sport has enjoyed, and what has taken place to date promises to be far surpassed by the growth in the immediate future.

A visit to one of the grand American handicap shoots, held annually in various parts of the country and attended by great throngs of people, is a revelation of the popularity which this sport is gaining among people of all walks of life. At these events one finds men and women of various ages, as well as boys and girls—all enthusiastic about trapshooting. They like it better than baseball or football because, for one reason, the formation of teams is not necessary to the enjoyment of the sport, although all who prefer may shoot in teams when so inclined. This adaptability of the recreation has proven an important factor in its widespread adoption. Furthermore, trapshooting, unlike ball games and tennis, does not call for violent exertion. While golf is a milder game than these others, it must be played on a course that is more or less expensive to acquire and maintain, whereas with only a small equipment anyone can enjoy the zest of shooting clay pigeons.

This outdoor recreation, now gaining such widespread favor, has already proven to be the modern substitute for the vigorous training that every pioneer in the early days received because of the dangers as well as the rigors of the wilderness—a training which really was one of the nation's chief sources of preparedness, because it developed men of skill and self-reliance. Modern life has all but deprived the average person of such training, and it has remained for trapshooting, now placed within the reach of the many by reason

of inexpensive targets and cheap efficient traps, to supply the lack which so vitally affects the life of the American people and their national welfare. One trapshooting club recently displayed this significant motto in its home city: "There are 500,000 trapshooters in the United States. When occasion demands, equipped with rifles, these men will give the nation the best army of sharpshooters the world has ever seen."

A majority of those interested in trapshooting are members of some club. Ten or 12 years ago there were not more than 500 clubs in the United States, while the total today, as already stated, is approximately 4,000, and is increasing rapidly. The five states having the largest number of organizations are Pennsylvania, New York, Illinois, Ohio, and Missouri. In the first two, there are about 400 and 300 clubs respectively — more than the total for the country a decade ago. It is remarkable what a diversity of interests are represented in these clubs. Dartmouth College, Princeton, Yale, and Harvard universities were the first schools of their class to organize shooting clubs. These were followed by Columbia University, Pennsylvania State College, and Williams College. The groups in five institutions, Yale, Princeton, Cornell, Dartmouth, and Harvard, are organized into the Intercollegiate Trapshooting Association, which has greatly stimulated interest in the sport among college men. Such preparatory schools as Mercersburg, Northwestern Academy, Pawling, and Tome, each has active clubs. In quite a different sphere of activity are the members of the organizations in the United States Navy. There are groups on the "Arkansas," "New York," "Florida," "South Carolina," "Texas," "Wyoming," "Oklahoma," "Cheyenne," and "Glacier." These marksmen held a most interesting tournament last spring in Guantanamo Bay, Cuba, while the Atlantic fleet was at the proving grounds there.

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Unusual Trapshooting Tower Owned by a New England Club: Targets are Released from the Top, the Gunners Standing on the Platforms

The northernmost of all the clubs under the American flag is at Nome, Alaska. That body frequently holds its shoots on—or in—five feet of snow and has the further distinction of conducting its contests at midnight, although not by artificial light, for the midnight sun supplies the illumination. The popularity of the sport in country towns and small cities is well illustrated by the success of the club organized a few months ago in Wausau, Wis. This group started with a few shooters who depended on a hand trap to throw their targets. Today it has 125 members, owns a fine clubhouse, and is rated one of the strongest organizations in the Middle West. The municipal authorities of Sedgwick, Colo., did an unusual thing last year by hiring a professional trapshooter to give exhibitions every Saturday afternoon and so stimulate interest in the sport. The employes in the hardware stores in Sioux Falls, S. D., have formed a club and conduct shoots every week, in season. Farmers in many parts of the country are taking up trapshooting, and many shotguns, that have long hung over the door undisturbed because of the increasing stringency of the game laws, are being used once more.

Outside the membership of the hun-

View Taken at a Grand American Handicap, Which Is the Great Annual Event in the Trapshooting World. Picked Shooters from Leagues in Many Parts of the Country Share in the Invigorating Outdoor Tests of Skill. The Squads of Marksmen are Shown at the Edge of the Open Area, Facing the Low-Lying Trap Houses at the Left of the Picture

dreds of clubs there are many families and small informal groups that enjoy this sport. Besides a gun, shells, and targets, a hand trap, which costs only about $4, is all the equipment required. The hand trap has done perhaps as much as any one thing to bring the sport within the reach of the many. It is a comparatively simple spring-operated mechanism held in both hands somewhat as one holds a gun. After it has been set and loaded with one of the saucer-shaped clay pigeons, it is discharged by pulling a trigger and will throw the targets in a great number of ways. Even a boy or girl, with training, can operate the trap so as to call forth all the skill of a veteran shooter. The device is employed in a great variety of places. With it targets can be thrown from the deck of a launch while members of the launch party on board try their skill with their guns. Hunting parties often resort to trapshooting when game is scarce, and often picnickers who prefer target-shooting to killing live creatures, find it a splendid pastime. Many a city dweller has found himself too far from the forest or prairie to learn to hunt, or if he has been skilled in the past, he has been unable to keep in practice. To such persons trapshooting is a great boon. A short trolley ride will usually bring them to a bit of open country where keenness of sight, quickness of thought, and steadiness of nerve can all be brought into play in an exhilarating hour of targetshooting.

Persons of distinction and wealth, no less than the great mass of the common people, are enthusiastic about this sport. King George of England and King Alfonso of Spain are expert trapshooters, and the same is true of many prominent men in this country. On the other hand, boys and girls have won distinction in this field of recreation. Master Bruce Steele, of Birmingham, Mich., when only 12 years old, broke 94 out of 100 targets—a record which perhaps even the royal trapshooters cannot equal. Miss Lucille Meusel, of Green Bay, Wis., when in her fifteenth year, made "straight runs" of 17 and 19 shots and could hit 23 out of 25 targets. She was taught to shoot by her father. Because they both loved the sport, a fine comradeship sprang up between them, and it has not been uncommon for this girl and her father to spend an afternoon together in the open, trapshooting. Another proof of the universal appeal of this pastime is that even crippled persons can engage in it. In the accompanying

illustrations are pictures of two men, each deprived of one arm, who are expert trapshooters.

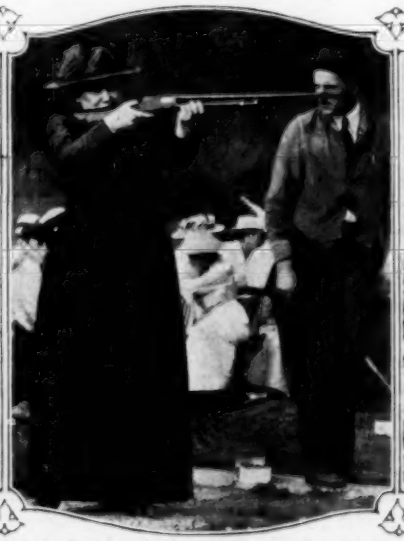
The history of many trapshooting clubs, large and small, shows that it is a comparatively easy matter to start an organization of this character. A group of two or three interested persons can obtain, free, trapshooting literature which is issued in great variety by powder companies, for distribution among prospective members. The pamphlets explain the advantages of the sport and also outline each step in building up an organization, from the calling of the first meeting to the management of league shoots. Where practical, some companies will sometimes send, without charge, an expert to assist the amateurs in making the right start. In selecting a site for club grounds a location should be chosen which is easily accessible, and it should have no dwellings or outbuildings within 250 or 300 yards of the firing line. If possible the grounds should be laid out so that the marksmen face the northeast, toward a clear background.

These Adjacent Pictures Are Photographs of Two Crippled Men, Both of Whom Are Expert Trapshooters

It Is Interesting to Note That One Shooter has Lost His Right Arm; the Other, the Left

It is surprising what a small outlay is necessary to start and equip a club. If the members wish to be very economical, they can get along with a shelter costing only a few dollars, while for $100 they can erect a plain but very satisfactory clubhouse. Working plans of such a structure, as well as of far more costly ones, can be obtained free from one of the powder companies. The principal item of equipment in addition to the shotguns and the targets, which cost about $5 per thousand, is the trap. This may be a hand trap, already described; a portable trap, operated by a cord and costing $6.50, or a so-called automatic trap. The latter is always housed in a low, heavy-walled shelter, called the trap house, with an open side which faces away

Even Old Men Are Enthusiastic About Trapshooting: This Marksman Is a Confederate Veteran Living in Oskaloosa, Iowa



A Sport from Which None are Barred: A Middle-Aged Mother can Learn to Shoot, as This Picture Bears Witness, as Well as Her Husband and Children

A Shooter in His Teens Who in a Recent Handicap Proved a Better Marksman Than Many of His Elders

Trapshooting Appeals Alike on Land and on Water: The Simple Device Which Makes Possible the Enjoyment of the Sport in Such a Variety of Circumstances Is the Hand Trap, Which is Shown Here About to be Discharged by the Boy at the Left. The Rise and Fall of the Boat Only Adds to the Zest of the Contest

from the firing stations. A helper, called the "trapper," sits in the shelter of the trap house and loads the machine with clay targets. A man, or boy, known as the "puller," is stationed a few feet behind the firing line and operates a lever which is connected with the trap by means of a rod or wire. The machine is set and released by the puller, according to the signal of the man about to fire. These automatic traps are made in different styles. One costs $35 to $40, while another rents for $30, for the first year, and $10 for each succeeding year, with a $15 refund on the return of the trap. The firing stations at which the marksmen stand are usually five in number

Watching Others in the Squad While She Waits Her Turn: The Gun is being Held in the Proper Way to Avoid Accident

A Familiar Figure at Many Shoots: This Man, Though Deprived of Both Limbs, Is an Expert Referee, His Low Position Giving Him an Advantage in Judging Targets

Miss Lucille Meusel, the Youngest Shooter in the 1916 Grand American Handicap: At 15 She could Hit 23 Out of 25 Targets

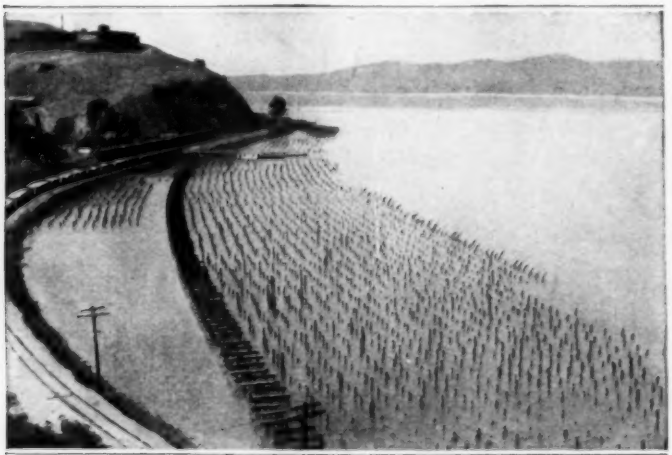
and are placed from three to five yards apart on the arc of a circle, the center of which is 16 yards from the stations. The traveling limit of the targets is about 50 yards.

From the foregoing figures it can readily be understood how some clubs have started up with an expenditure as low as $15 or $20, where only a hand trap has been used, and that for $150 other organizations have provided themselves with a neat clubhouse, an automatic trap, and a few accessories. The membership fee in most clubs is $2 per year. In addition to the purchase of a gun, the cost of which will be from $20 up, according to the individual taste, each member must pay for the shells he uses and the targets he shoots at. The charge usually made for the latter is from three-fourths of a cent to one cent each, thereby allowing the club to make a small profit. A box of 25 of the less expensive shells sells for about 75 cents.

The grand American trapshooting handicap, held last year in St. Louis, gathered together from the four corners of the country the best shooters of the various leagues which constitute the national association—a splendid company whose favorite pastime in the outdoors had given them marvelous self-control and alertness. The gathering was inspiring proof of what this most democratic of sports can do for people of all walks of life and was an indication of the great hold that it is to gain in the coming years, resulting in the betterment of thousands of individuals and in making the nation as a whole better prepared to meet the future. For the first time women amateurs contested, 10 shooting in the big events. In the week's scatter-gun tournament, 618 men, women, boys, and girls participated. The winner of the premier event of the meet was a veteran trapshooter who declared that he had been training for that victory for the past 17 years. A splendid thing about trapshooting is that the fine development which those years of recreation had given him differs only in degree from that being acquired by every person who shares in the sport.

REMINDERS OF CALIFORNIA WHEAT-GROWING DAYS

A strange-appearing reminder of the days when California was one of the great wheat-producing centers of the world is to be found in the rotting piles that line the shore of upper San Francisco Bay. It was here that wheat, carried by trains and barges from the extensive fields of the interior, was graded and stored before being loaded onto the clippers that crowded the bay, waiting to transport the grain to the markets of the world. Some of the warehouses were three-quarters of a mile long. When at length wheat-growing became unprofitable, the buildings fell into disuse and many of them were pulled down and others burned. Today their sites are marked by the charred and rotting piles that project in long rows above the water.



These Piles Are Practically All That is Left of the Great Wheat Elevators That Housed Much of California's Wheat Crop in Other Days

BIG CHIMNEY STACK FALLS AS DERRICK FAILS

Through the breaking of a derrick on top of an eight-story office building in Portland, Ore., a section of steel boiler stack, weighing 6,700 lb., which was being hoisted to place above the roof, was dropped 145 ft. to the temporary wooden roof of a two-story annex below. It crashed through this roof to a concrete floor on the second story, but was there stopped, apparently without damage to the concrete slab. The stack was flattened and had to be returned to the shop. When the accident occurred, the last of three new sections was being added to the chimney of the building in an effort to prevent smokiness. The section of stack was 15 ft. long and 10 ft. 6 in. in diameter. The derrick in use had an A-frame composed of 14 by 14-in. timbers of Douglas fir, with a vertical height of 45 ft. and a spread of 50 ft. It had no stiff legs, but was guyed to the roof with two sets of steel cables, anchored to concrete girders. The boom was a single stick of Douglas fir, 106 ft. long, working on a vertical pin 4⅛ in. in diameter. Its weight with fittings was about 6,600 lb. The failure came through one leg of the A-frame twisting or tearing off just below the top connection. The boom fell in a vertical line, struck on a fire wall, and broke off a few feet outside. The steel stack section struck the wooden roof below with its nearer side about 40 ft. from the wall. Inspection after the accident showed that the timber of the derrick was not entirely sound, but no real decay was visible. It was seriously weakened by bolt holes.

Section of Steel Smokestack, Weighing Over Three Tons, in the Act of being Hoisted into Position above the Roof of an Eight-Story Office Building, Just Before the Derrick Broke and Let It Drop

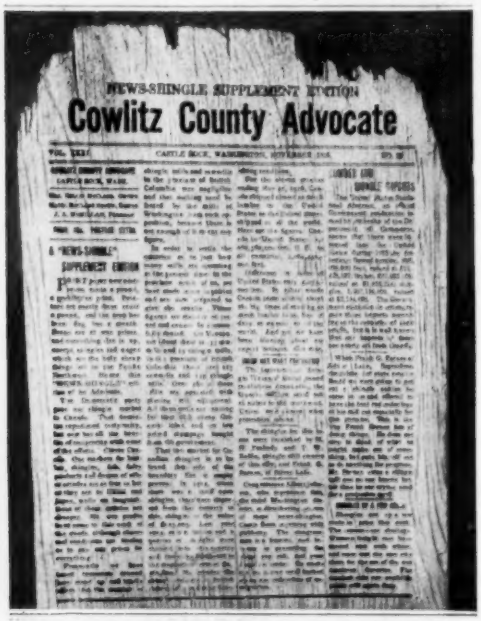
This Shows the Wreckage of the Derrick as It Appeared on the Roof of the Lofty Building after the Accident. Note the Fractured Timber Leg

Here the Fallen Section of Stack is Seen Where It Fell: It Crashed through the Roof of a Two-Story Building, but Its Fall was Halted by a Concrete Floor

LOCAL PAPER PRINTED ON RED-CEDAR SHINGLES

A special edition of 50,000 copies of a local paper, published in Castle Rock, Wash., was issued recently printed on red-cedar shingles. Castle Rock is in the heart of an extensive shingle-producing country and the present low price of shingles, together with the high price of paper, inspired the publisher to issue this novel edition. It is devoted chiefly to a discussion of the

lumber exports and imports of the country under the present tariff and was widely distributed. At the time


NEWS-SHINGLE SUPPLEMENT EDITION

Cowlitz County Advocate

Copy of a Special Edition of a Castle Rock, Washington, Paper Printed on Red-Cedar Shingles as Protest against the High Price of Paper and the Effect of the Tariff on the Lumber Market

the "paper" was printed, shingles could be bought wholesale at the rate of about six for a cent.

OPEN-FRONT AUTO GOGGLES PROTECT EYES FROM WIND

Automobile goggles which are entirely open directly in front of the eyes and yet afford ample protection against the wind, have been patented by a young man in South Bend, Ind. A wall of celluloid which projects forward from the face surrounds the eyes and is attached to a leather frame that fits snugly against the forehead and cheeks. This arrangement forms pockets in which the air is practically motionless and as one faces the wind these air cushions protect the eyes so that they scarcely feel the draft at all.

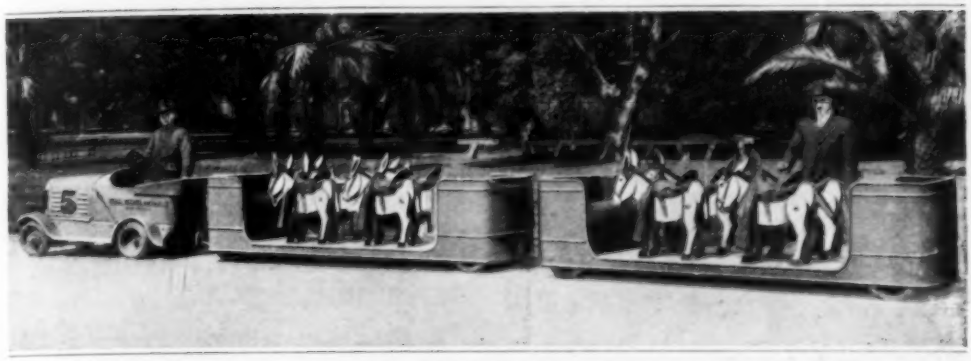
Goggles Which Are Open Directly in Front of the Eyes but Which Have a Projecting Wall of Celluloid That Protects Them Entirely from the Wind

NEW SIBERIAN PORT TO AID RUSSIA IN WAR

Russia has recently opened a new Pacific terminus for its great trans-Siberian railway and thereby hopes to relieve the congestion of shipping which has overwhelmed Vladivostok since the war began. The new port is Nikolaievsk on the Gulf of Tartary, at the mouth of the great Amur River, and about 850 miles north of Vladivostok. Freight received at the new terminus will be sent up the river for some distance and then transferred to a branch railway which connects with the transcontinental line. The immense task of double-tracking the trans-Siberian railway was begun several years ago, but when the war broke out large additional forces were put to work to complete that undertaking. Now that the double-tracking is finished and the new port is open, it is expected that the volume of supplies which will be shipped from Japan and the United States to the Russian fronts will be greatly increased. Until now the wharves and warehouses have been piled high with goods, which Vladivostok could not handle fast enough.

MINIATURE-TRAIN SERVICE FOR CITY PARKS

The miniature auto-drawn trains, which attracted so much attention at the San Francisco exposition in 1915, are being introduced in various city parks and have proven not only a source of entertainment but of convenience as well. Train service of this character was inaugurated in Lincoln Park, Chicago, last summer. Each train consists of a very small but strong automobile and several low cars.

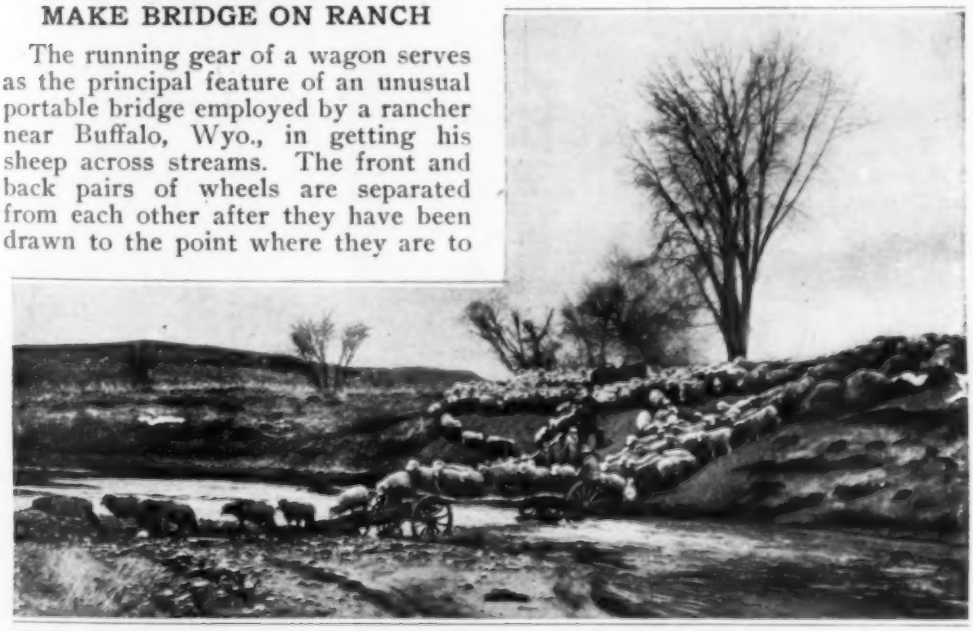


A New Variety of Miniature Auto Train Which has Proven a Source of Much Amusement for the Children of Oakland, California

Most of the cars have long seats placed back to back so that the occupants face either side. A novel variation of this type of conveyance is called an "animal train." Mounted on the car floors are several small wooden donkeys, saddled and bridled. In addition there are cushioned seats at either end. One of these trains is in operation in Oakland, Calif., and has been a source of great delight for many youthful patrons.

RUNNING GEAR USED TO MAKE BRIDGE ON RANCH

The running gear of a wagon serves as the principal feature of an unusual portable bridge employed by a rancher near Buffalo, Wyo., in getting his sheep across streams. The front and back pairs of wheels are separated from each other after they have been drawn to the point where they are to be utilized. One pair is placed in the stream near one bank and the other pair near the opposite bank. The gap between the two is spanned with logs, and approaches of similar material are provided. A number of sheep dogs assist in rounding up the flock, while men near the approach to the bridge encourage and urge the animals along. This ingenious arrangement is used by the rancher in getting thousands of sheep across streams, and saves the cost of building structures which might be washed away.



A Strikingly Beautiful Scene on a Ranch near Buffalo, Wyoming, Showing a Portable Bridge Made with Wagon Running Gear and Logs and Used in Getting Thousands of Sheep across Streams

HOT-WATER BATHS IN SANDS AT BORDER FOR SOLDIERS

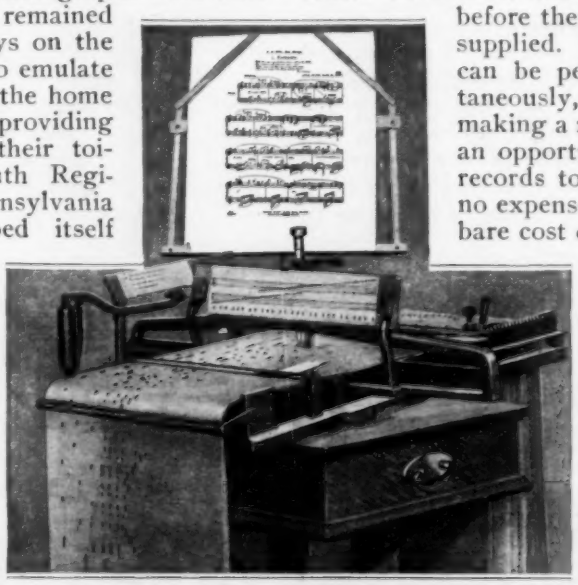
Some of the crude but ingenious bathing facilities devised by soldiers in the European trenches have been seen among the war photographs from time to time. But it remained for our own boys on the Texas frontier to emulate the comforts of the home to the extent of providing hot water for their toilet. The Eighth Regiment of the Pennsylvania infantry equipped itself with bath-houses and then installed water-heating plants adjacent to them. One of these consisted of a brick furnace with a cylindrical boiler on top connected with coils, made of ordinary iron pipe, supported in the fire box. Cocks were provided in the system so that the pipes could be thoroughly drained at night to prevent them from bursting at times when the temperature dropped below the freezing point. The heating plant—furnace, boiler, and all—was heavily covered with mud.

The Water-Heating Plant Consists of a Brick Furnace with an Iron Tank Placed Horizontally on Top of It

When Completed, the Furnace and Boiler are Covered with a Heavy Blanket of Mud so That the Heat is Retained

PLAYER-PIANO MUSIC MADE WITH SMALL MACHINE

Designed especially for the use of retail dealers, a compact machine that perforates music rolls for use in player pianos is being introduced. The apparatus is capable of making from one to 16 records at a time from sheet music, and will also turn out copies of any standard roll. Its operation is said to be so simple that satisfactory work can be done by persons who are not musicians. The particular advantage of the machine seems to be that it enables a small dealer to fill his customers' orders promptly without having to carry a large, expensive stock. It also obviates the inconveniences that confront patrons when special orders have to be mailed to a factory before their wants can be supplied. Since 16 sheets can be perforated simultaneously, a dealer in making a roll to order has an opportunity to add 15 records to his stock with no expense other than the bare cost of the paper and spools.



Sixteen Rolls of Player-Piano Music can be Perforated on This Machine at One Time. The Device is Intended for Either Small Dealers or Piano Users

¶The authorities of Los Angeles have been asked by certain exporters to establish a municipal ocean-steamship line. The city's charter permits such undertakings.

Sailors' Sensations in Battle

by Lewis R. Freeman

"'The torpedo fascinated me for a moment. In that marvelously clear water I could note its every detail.'"

Being Torpedoed

I HAVE talked in the last few months with many men who have been aboard one kind of craft or another when it was torpedoed—trawlers, cruisers, and ocean liners—but no one of them has been able to give so comprehensive, so illuminative an account of what the experience was like—of what happened to himself, the ship, and to those on board the ship—as Capt. Rupert S. Gwatkin-Williams, the officer who was in command of the converted Irish Channel packet "Tara," when she was sunk by a German submarine in the Mediterranean at the end of 1915. Through the courtesy of the British Admiralty, I interviewed Captain Gwatkin-Williams while he was in London, waiting to proceed to his new command, and the account of the torpedoing of his ship which follows is from his personal diary, written while he was a prisoner of the Senussi, to whom he and his men were handed over by the commander of the German submarine.

"It was a fine morning, and I was on deck looking for Sollum, which we were approaching. Suddenly the lookout in the crow's nest gave a hail and pointed. Looking over the starboard rail I saw a torpedo, about 300 yards away, leaping toward us. Habit made me look at my wrist watch. It was 10:10 a. m. The torpedo fascinated me for a moment. In that marvelously clear water I could note its every detail. The fishlike body showed bright vermilion in the sunlight, with black square patches on top where the balance chamber was. It seemed to travel along in ever-quickening spurts, and as it got closer and closer I could see the detonating apparatus of striker and 'whiskers' in its nose, and the various valves and levers for adjusting and starting the engines.

"I realized at once that we were a 'goner,' our speed being too slow to dodge. Nothing but the unlikely event of the torpedo failing to explode could save the ship. On rushed the torpedo. The ship was just beginning to gather weigh, when she was struck on the starboard side, fair against the engine room. A dull, mumbling, cracking roar, and a great black column rose as high as the main lower masthead. I suppose that it was formed of water, smoke, coal, and debris, but it was impossible to say. Only its blackness impressed me. A

great yawning hole in the side, the deck blown away, and the aerial of the wireless destroyed—this was the result."

Captain Gwatkin-Williams goes on to tell how a well-aimed shot from his gun on the forward deck forced the submarine, which in the meantime had come to the surface a mile astern, to withdraw its periscope. "We at least had the satisfaction of knowing that the submarine was blind for the time being, and could not torpedo us again without putting up its 'eye.' But it was a poor satisfaction after all. The old ship had steamed her last mile. No answer came from a call down the engine-room voice pipe to order the engineers to come on deck. Only a confused gurgling sound bubbled up the tube. All in the engine room were dead, having been overwhelmed by the explosion and the rush of water. No human hands ever stopped those engines. They were still turning when she made her last great plunge, 100 fathoms deep, into the Mediterranean.

"The ship settled down steadily on an even keel. Suddenly, without any warning, her bow shot up in the air at a sharp angle, and a great wave seemed to rush at us from aft. It was like the bursting of a milldam, and on its foaming crest it bore boats, spars, meat safes, and broken wreckage of all descriptions. This was rather an uncomfortable moment, being unexpected, and I couldn't think what was the most sensible thing to do. However, matters were soon settled for me. Before the avalanche and its battering ram of tossing debris I fled, and was washed down the ladder onto the fo'c'sle, from which vantage point I quickly took a dive overboard. Going overboard into that calm sea looked simple and easy, but I found to my disgust that I was instantly sucked back again, this time with the ship under water, and my head against the very awkward problem of the fo'c'sle awning.

"As she went down, amongst the churning bubbles, I could see the daylight getting farther and farther off. I had my clothes and boots on. I think if I had been wearing my life belt I would have been drowned. But my life-saving collar was safe in my pocket, uninflated, and, being heavy, I managed to struggle and dive a little deeper and get clear of that all-embracing awning.

"Up, up I went, the gay sunshine getting nearer and nearer once more, till I seemed to feel its warmth. The bubbles raced past me and reminded me of pictures I had seen as a child, depicting people going to heaven, with the silver stars all around in a blue firmament, and a great light above. Up, and the pressure on my lungs got less, till, with a great gasp, I found myself on the surface, shot halfway out of the water, practically none the worse.

"Signs of the ship there were none, only a great heaving and churning of the water, broken every moment by spars and other light objects, disentangled from the sunken ship, hurtling into the air from the depths.

"I swam to the nearest life raft, and from there clambered onto the bottom of an upturned boat. Here I could stand up and survey the desolation. The whole surface was covered with brown oil, as well as with wreckage and swimming figures. Some who were injured were calling out for help, and close by was the body of the cook, floating in his life belt."

Heavy as was the explosion and comparatively small the ship—she was under 4,000 tons—in the case of the blowing up of the "Tara," Captain Williams assured me that the shock of the explosion where he stood—about a hundred feet away—was by no means great; that, had he not seen the torpedo, he might well have thought the ship had touched bottom or run down a smaller boat. "The shock itself," he said, "was not so very different from that which runs through a ship under the impact of a breaking head sea, and I have lurched more unsteadily on my feet from the jolt of a ferryboat entering a slip."

In an explosion of this kind one's

proximity to it has, of course, a great deal to do with the shock, both physical and mental, experienced. To the stricken engineers of the "Tara," none of whom survived to tell what he felt, the explosion must have been little short of primal chaos. Even the wireless operator, whose cabin was wrecked by the torpedo and who was rescued in only the shirt of his pajamas, told me that it was as if the whole ocean had gathered itself into a single huge jet and started to rush up through the ship. "One end of my cabin—I was in bed at the time—was torn right off," he said, "and I was thrown out on the buckled-up floor. Luckily, the door was jammed open, and I had just room to squeeze through into the companionway and make for the saloon."

"'Up, up I went. . . . The bubbles raced past me and reminded me of pictures I had seen as a child, depicting people going to heaven, with the silver stars all around in a blue firmament, and a great light above.'"

These two instances cover so completely the experiences of the several dozen survivors of torpedoed ships with whom I have talked that, beyond personal injuries and impressions, there is nothing more that could be added.

Being Mined

The effect of a mine on a ship is usually very similar to that of a torpedo striking in the same place. As a mine's contact is almost invariably in the shape of a "clean hit" on one of the bows, the injury is more often "true to type" than that of a torpedo, which may hit anywhere from forefoot to rudder. It is the similarity of the action of a mine and a torpedo which may give rise to so much uncertainty in the event that the injury is to the forward part of the ship. The finding of a fragment of torpedo in the wreckage is all that has definitely established the cause of the injury in a number of notable cases.

It may be a coincidence, but of men I have talked with, a larger proportion from mined than from torpedoed ships have mentioned the great shock of the explosion. This, however, might be explained by the fact that a properly aimed torpedo strikes more or less amidships, and has more of a chance to expend itself upward in the comparatively open spaces of the engine rooms than in the confined forward bulkheads where the force of a mine is exerted. The "kick" of a mine, too, being more often in the opposite direction to which the ship is traveling, is calculated to produce more of a jar than the broadside "knock" of a torpedo. For the rest, the experiences and sensations of the man on the mined passenger steamer or warship are not different from those met with in a similar mishap from a torpedo.

State of Mind in a Naval Action

The question of what a man is most likely to think about when under fire, or in action, has been much discussed since the battle of Horn Reef. Much evidence has been collected and many theories advanced. Obviously, the answer will depend very much upon the man, what sort of fire he is under, and—especially—what his duties are. Generalizing very broadly from conversations I have had with, and letters I have read from, men who went

through this greatest of naval battles, I should say that, so far as the British sailor is concerned, the concentration of mind in carrying out in action the duties which he had trained so assiduously for during many years of peace, pretty effectually kept his thoughts from wandering far afield. The following extract from the letter of an officer whose ship gave and took some of the hardest knocks, seems to me to indicate a state of mind fairly typical of the average British sailor in action.

"I suppose I was too busy to think. We just got on with the work and that kept us stretched. When we got a German cruiser, I said 'Our bird,' and I have an idea we passed a word or two when a shell gave our turret a rap that made our teeth grind; but as for 'happy memories of boyhood days' and 'The Little Gray Home in the West' —nothing doing. You've got to keep your mind on one thing, and that isn't 'memories of home,' but your work. If a sailor tells how, with shells exploding and men being killed around him, he was thinking of a girl at home, don't believe him, especially if he is telling it to the girl. One does a bit of thinking on the way home after the battle, and that's when the sailor gets soft and imaginative.

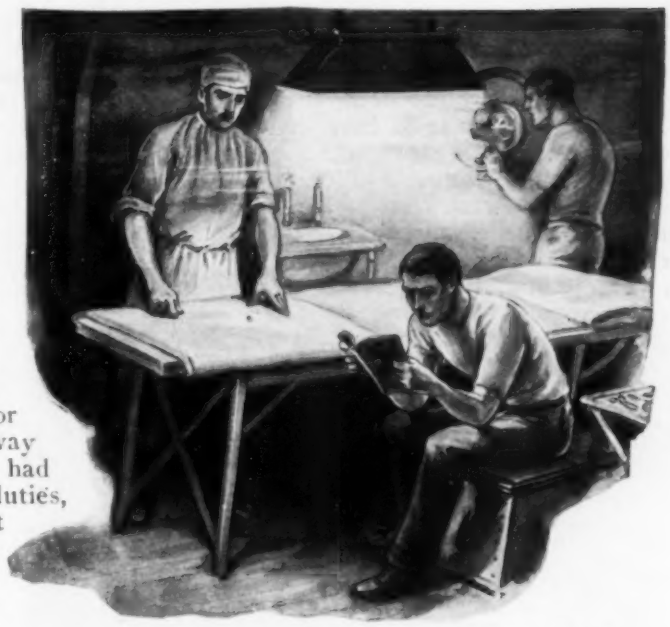
"In some ways you do not even think about the fighting, at least not to call it thinking. You think about what you're doing, and you've a hot sort of interest in the way the fight's running, though that doesn't do you much good, because you know no more than you can see, and you can't see much of anything but smoke and fumes and splashes. There are things, of course, that get fixed in your mind—like when you see a ship go suddenly—and later on these things come out so clearly that you know you will never forget them as long as you live. It may be you've got it a little wrong (that's what leads to argument when men remember differently), but your own impression sticks and you would swear by it. My impression of action? I can't say much except that we were steaming fast, firing fast, and that there were more shells flying about than I care to think about now. I remember somebody picking up three or four severed legs and throwing them overboard, and thinking that it was the sensible thing to do. I saw bodies in the sea, too. The rest is chiefly smoke and noise."

An officer who recently showed me over a superdreadnaught that had been in action during a part of the Horn Reef battle, said that he had only the vaguest recollections of what went on about him during this time. "This very one of my two 'babies,' " he said, patting affectionately the massive breech of the 15-in. gun he had been explaining to me, "accounted for at least one German destroyer, but I was so much engrossed in keeping them 'talking' that I had no eyes or ears for anything else. The noise must have been something stupendous, but I have no distinct memory of its impressing me. My principal recollections are of how hot it got in the turret after we had fired a few rounds, and how deucedly uncomfortable it was that night—we 'stood by,' hoping to get another crack at the Germans, for the next twenty-four hours—trying to snatch a nap curled on that steel grating."

An officer of a British cruiser which had stood perhaps the heaviest fire of any of the ships not sunk, told me of an interesting incident. "We were under the concentrated fire of two or three German battleships at the same time," he said, "and the detonations of their shells, striking the water and exploding, came to us, even 'tween decks, like the roar of our own secondary batteries. The whole Hun-ward horizon was shut off by a wall of tumbling spray fountains. Unluckily, not all of the shells were striking the water, and among those that came aboard were several charged with some sort of asphyxiating gas. The fumes of one exploding near me were so thick that I could not see my hands before my face, and enough of the stuff was getting under my mask to make me feel very groggy when the blast from

an ordinary shell—although it knocked me off my feet—cleared the air and made it fit to breathe again."

The experiences of the survivors of ships that were sunk in the great battle were very terrible and it is only natural that they are spoken of with reserve. All of the British ships went down with their guns still firing, but one poor chap, who was in some way cut off from whatever had been his regular duties, confessed to me that the greatest relief he ever felt in his life was the deep, cool plunge into the sea out of the hell that was raging on the surface. "Fact is, sir," he told me, when I talked with him in his lounging chair on the terrace of the hospital where he was resting his shattered nerves, "I was so fed up with it, that I must 'a' ducked under a dozen times before I was picked up, just tu get away fro' the bloody 'ell o' it all."



"'One chap, who was devouring a penny dreadful, fairly fascinated me with the pop-eyed wonder with which he followed the story. . . . I realized that he was just a healthy, normal young Briton, taking things as they came.'"

The doctor of a great superdreadnaught which, though dealing some heavy blows herself, went through the latter stages of the battle without a scratch, was just about the only person I have talked with who confessed to much in the way of introspection, and in his case it was undoubtedly due to inaction. He told me about it in the very operating room where, with his staff, he had waited for the wounded who, mercifully, did not come. "It was rather trying," he said, "standing by down in this little hole, with the guns booming above, the ship fairly throbbing with the vibration of her speeding screws, and never a thing to do but twirl my thumbs and think. I did a lot of it, but it was mostly the aimless sort of reflections that run through one's mind in waiting for a tram or a train. But my men did not appear to find the time hanging heavy in the least, nor to be at all tried, or even bored, by the restraint. One was writing a letter, another playing solitaire, and the rest were reading. One chap, who was devouring a penny dreadful, fairly fascinated me with the pop-eyed wonder with which he followed the story. At first I thought his preoccupation was sheer 'swank,' but after I had seen him turn two pages and then stoop down and replace an instrument that the vibration or the jolt of the guns had shaken from the operating table, all without ungluing his eyes from the page, I realized that he was just a healthy, normal young Briton, taking things as they came as a part of 'the day's work.'"

¶ Passengers on German railways have been requested to supply themselves with warm clothing, as the management has announced that, on long trains especially, sufficient steam cannot be supplied in very cold weather.

NEW TREATMENT FOR BURNS CONSIDERED REMARKABLE

Among the wounded on the battle fields are soldiers with horrible burns caused by bursting projectiles, liquid fire, or scalding water. On the western front the allies transport the worst of these cases to a special hospital near Paris where the men are given the benefits of a new treatment that has lately come to public notice. In the short period of a few weeks, "living corpses" almost without human semblance that enter the institution, leave it without scars and, more wonderful still, with scarcely any visible evidence of the torturous injuries from which they have recovered. The treatment, the discovery of a French physician, is considered to be of inestimable value. Next in importance to the almost unbelievable results it accomplishes, is the fact that it banishes a patient's suffering within a few hours. It is a painless cure for burns of all kinds, including acid ones. After being cleansed with warm water and thoroughly dried with hot air, an atomizer is used to spray the burned flesh with a preparation composed of paraffin and resin, made liquid by heating it to a temperature of about 158° F. This gives the wound a waxlike coating, over which cotton batting is laid in thin strips. The hot liquid is then applied to the latter with a brush, an air-tight sealing thus being provided. This operation alleviates pain quickly and within 24 hours overcomes it. The dressing is removed daily and the whole treatment repeated. Almost regardless of how serious a burn may be, the flesh grows back with a covering of new, smooth skin when this procedure is carried out properly. The paraffin-resin preparation is very difficult to make, and thus far no one except its discoverer has been able to manufacture it.

WINGED MESSENGER OF MAN

Symbolical Bronze Statue, Weighing 16 Tons, That Now Crowns the Tower of the New Telephone and Telegraph Building at New York

ELECTRIC LANTERNS FAIL IN RAILWAY TESTS

Since portable electric lanterns of certain types are being used extensively in many industries, it is not strange that surprise is frequently expressed at the failure of railway companies to adopt equipment of this kind for trainmen. The idea is not a new one so far as most transportation companies are concerned, and the reason that coal-oil lanterns have not been generally discarded is that electric ones do not seem to be suited for railroad needs. Experiments were conducted some time ago by one of the big western lines for the purpose of determining the advisability of making such a change. The inquiry showed that the operation of electric lanterns would cost the company about seven times more than those of the usual type. It was also found that when an electric-equipped lantern is dropped onto a hard surface from a height of two or three feet the filament in the globe is most liable to break. These two things caused the company in question to abandon the idea. Lamps of the flash-

light type include the above objections and also have a third and equally serious one. Their very character, it is contended, would make the revision of the American Railway Association's code necessary before all signals could be rendered with them advantageously. Of course, on several of the big lines electric lanterns are employed by sleeping-car conductors, but that is about as far as their use has ever gone.

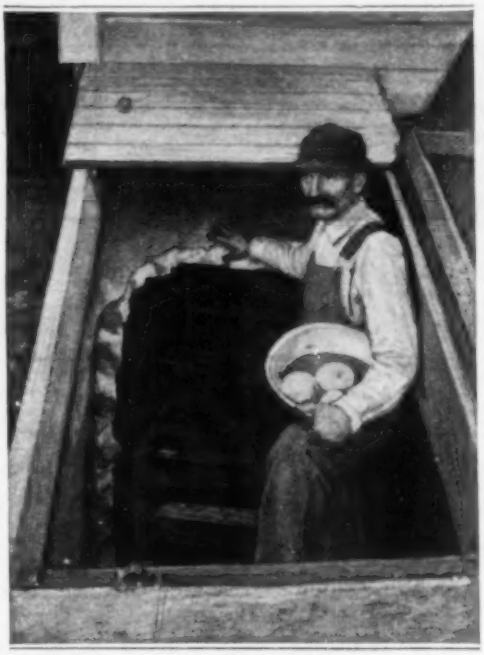
TARGETS TO KEEP HUNTERS FROM SHOOTING AT SIGNS

Recognizing the fact that many hunters seem to be possessed by an overwhelming desire to shoot at conspicuous signs, regardless of the damage that may result, the Automobile Club of California has provided special targets for such sportsmen in the hope that they will thereby be prevented from mutilating the road signs which the club has erected. The target, which is of the conventional form, is painted on the posts of the signboards. It is far enough below the lettered surface to save the latter from being hit, if a shot is fairly well aimed. Painted near each of these targets are these words: "If You must Shoot, Shoot Here."

Rather than have the Signboard Mutilated by Shot the Makers of This Sign have Provided a Target on the Post for Hunters Incapable of Self-Restraint

INCUBATOR INSTALLED IN ABANDONED CISTERN

A cistern in Port Townsend, Wash., which had been abandoned because of the installation of a modern water system, is now used as a storeroom and for hatching eggs. The owner dug away dirt at the side of the empty chamber, knocked in a portion of the wall, and built stairs down into it. The entrance was covered with a trapdoor. This transformed the empty cistern into a very desirable storage place that was dry and free from rats and mice, and was always cool without ever being cold enough to freeze. Here fruits, vegetables, and an incubator were kept. In this room the incubator hatched a higher percentage of eggs than ever before.

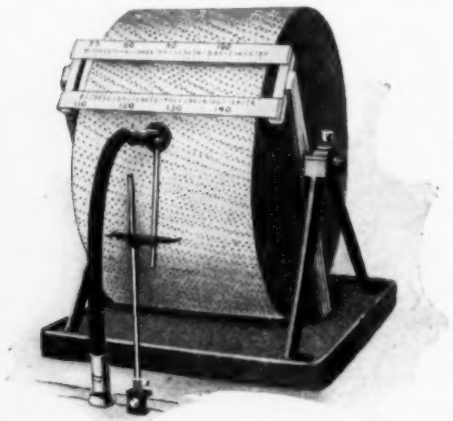


Abandoned Cistern in Port Townsend, Washington, in Which an Incubator has been Installed; Storage for Fruits and Vegetables is Provided Also

¶The United States government is to place an electric sign on the upstream face of a railway bridge over the Ohio River at Louisville, warning river voyagers of the dangerous falls about a mile below.

GUIDING THE EAR BY THE EYE IN LEARNING TO SING

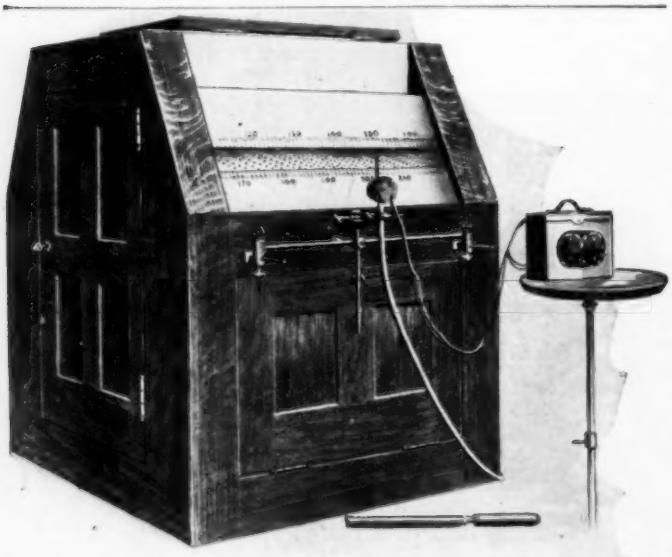
An instrument known as the tonoscope, shown in the accompanying illustrations, projects the vibrations of the voice upon a screen, on the principle of moving pictures, in such a way that the singer or speaker can see the pitch of his voice the instant he sings or speaks. The instrument is used especially in training singers and in making scientific investigations on singing.



Mechanism of the Tonoscope, Showing the Revolving Screen Which Indicates the Pitch of Musical Sounds

The singer, standing at the side of a telephone apparatus, sings in front of it, or directly into a speaking tube not shown in the illustration, and the vibrations of the voice cause a little flame in a capsule at the center of the front of the apparatus to flicker so that it actually goes down and rises with every vibration of the voice. Inside of the case is a large drum containing over 18,000 holes arranged in rows so as to represent a series which makes a complete octave. If, for example, the singer sounds middle C, which makes 256 vibrations per second, the line on the drum which has 256 holes will seem to stand still and all the other rows are moving. The line which stands still points to that number on the scale. If he should sing a trifle sharp, then 257, 258, 259, or even a higher line, will stand still, and if he should sing flat a line of lower frequency would stand still, indicating the exact pitch.

The sound is seen exactly simultaneously with the hearing and it is possible to register down to an accuracy of a hundredth of a tone, or even finer.



Improved Model of the Tonoscope, by Which the Deaf may Teach Themselves to Sing and Play Correctly, without an Instructor

Educators of the deaf are interested in trying this principle in teaching the deaf to speak with pleasing intonation. A teacher can set a model so that the deaf person can learn to reproduce any given note by sight.

PUBLIC EMPLOYMENT SYSTEM IS PROVING ITS VALUE

According to an official announcement, the United States Employment Service, which is under the supervision of the Department of Labor, has succeeded

Scene on a Warm Day at a Portable Ice Station in a Crowded District of Columbus, Ohio, Where Cheap Ice may be Had by All Who Call for It

splendidly since its establishment about two years ago. The purpose of this institution, which is increasing in social and economic importance, is to promote the welfare of wage earners throughout the country and assist business concerns and individual employers in filling their vacancies. For the service it renders no charge is made. Offices are now maintained in 80 different industrial centers, and in order that their scope may not be limited, every post office has been made a local branch where employers and job seekers may obtain application blanks and forward them to the proper destination without postage. The volume and character of the work done at the Chicago headquarters has distinguished it as being one of the most important and efficient bureaus of its kind in the United States. Among other things, this office established the first public teachers' agency and thereby has done much in furthering the "better schools" movement. Careful investigation of all candidates is made before recommending them.

PORTABLE ICE STATIONS FOR HOT WEATHER

Small portable ice stations are operated during the summer months by an ice company of Columbus, Ohio, which has found them both useful and profitable, while they are a boon to many families in the districts they serve. The stations are built by a refrigerator company in all sizes. The size used in Columbus is a little building, 16 ft. long and 12 ft. wide. A space, about 12 feet square, is used for the storage of ice—floor, ceiling, and sides being insulated with mineral wool. In front is a small office and platform, where ice is delivered to those who call for it. A sign on each station indicates its purpose, and the ice is sold at the rate of 20 cents per 100 lb., while ice delivered from the company's wagons costs 35 cents per 100 lb. The stations are intended to serve a class of people that do not buy ice regularly from wagons. They are placed for the summer at convenient points in thickly populated districts.

CONCRETE VIADUCT BUILT ALONG A BOULEVARD

As part of the new rapid-transit system of New York City, it became necessary to run elevated trains along Queen's Boulevard in Long Island City. This being a fine example of the modern automobile highway, 200 ft. wide, it was decided to provide for the elevated railroad something more sightly and more suitable than the ordinary steel structure with its noise, vibration, and uncongenial aspect. A reinforced-concrete viaduct, in the form of an arcade, or series of vaulted concrete arches, with a solid floor, was decided upon and has now been completed after three years of work. It accommodates three tracks, and is about a mile long, and 44 ft. wide. The spans are from 52 to 65 ft. long, with clearances of 14 ft. for trolley cars. Three stations are built into the viaduct, with a mezzanine below the tracks for ticket booths. The concrete used in the structure was mixed at a central plant and hauled in buckets in five-car trains by locomotives of 24-in. gauge. Altogether 106,376 bbl. of cement were used in the viaduct.

This Concrete Viaduct of Ornamental Design Carries Elevated Trains for a Mile along Queen's Boulevard, Long Island City, and Is in Striking Contrast with the Ordinary Elevated Steel Structure

HOMEMADE CAR DRIVEN BY AIR PROPELLER

A young man living in Sandusky, Ohio, has constructed a small car which is driven by an air propeller and can travel at a speed of 28 miles an hour. The car itself is a light homemade cart, 6 ft. long and 40 in. wide. It is equipped with 20-in. bicycle wheels, an automobile steering gear, and a metal body, giving it some resemblance to a tiny automobile. Mounted behind the driver's seat is a 3-hp. marine motor to which is directly attached a 4-ft. propeller with blades 6 in. wide. The entire outfit weighs only 128 lb. It is the belief of the builder that by substituting a new propeller having blades with a greater pitch, he can increase his present rate of speed considerably.

Light Homemade Car, Driven by a Three-Horsepower Engine and a Four-Foot Air Propeller, Which can Attain a Speed of 28 Miles an Hour

¶A train, filled with various exhibitions and carrying 125 leading citizens of Arkansas, is now touring the country by way of advertising the resources of that state.

BREAKING OSTRICH TEAM FOR CITY DRIVING

As Docile as Two Old Plow Horses after a Short Term of Training, These Big Birds of the Desert were Driven through the Streets of Los Angeles Some Time Ago Along with Motor Cars and Horses When That City's Gala Event, the Rose Carnival, was Celebrated

Tired Out after a Spirited Trot in the Harness, and Resting His Neck across the Shoulders of One of the Trainers: Although He Is Powerful, and Exceedingly Capable of Pulling Heavy Loads, the Long Neck of the Young Ostrich, Before He has been Thoroughly Trained, Easily Becomes Exhausted

Grab an Ostrich by the Neck, If You would Handle Him. It Is Advisable to Remember, However, That He Kicks Forward

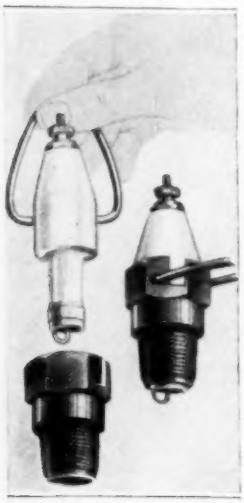
In California Everybody Eats Oranges for Breakfast, Even the Ostriches. The Birds, Incidentally, Prefer Their Fruit Served Whole

This Light, Four-Wheeled Rig was Used in Breaking the Team for City Driving so That It Might Participate in the Rose Carnival

To the Tenderfoot There Is Nothing Dull or Commonplace about Bird-Back Riding. A Man Must Sit on an Ostrich Just So, or There Is Awful Jolting in Store for Him

INSULATOR OF SPARK PLUG MADE DETACHABLE

One of the special features of a spark plug recently placed on the market is the construction of the insulator and the body as two separate units. By pulling on a small bail attached to the porcelain insulator, the latter can be instantly removed from the spark-plug shell without the use of a wrench or other tool. In service, both parts fit together tightly and no gasket is necessary; a convex-ground seat in the shell is forced against a ground surface on the porcelain, making the joint leak-proof. The detachable feature of the plug makes it an easy one to clean. It is also convenient for priming cylinders in cold weather, especially where there are no priming cocks on the engine. The insulator is simply slipped out and a few drops of gasoline inserted through the plug shell.



SUN TEMPLE OF GREAT AGE UNCOVERED IN WEST

Recent excavations made in the Mesa Verde National Park in southwestern Colorado, under the direction of representatives of the Smithsonian Institution, have brought to light the ruins of a sun temple many centuries old. It seems probable that the structure was erected about 200 years before Columbus discovered the American continent. This estimate is based upon the age of a red-cedar tree which was felled when the excavating was undertaken. The tree, according to expert estimates, was about 376 years old. Furthermore, it had grown on top of the temple, which indicates quite conclusively that the structure was an abandoned ruin in 1540. It is believed that it was constructed about 1300 A. D. Obviously the discovery is a matter of considerable scientific interest.

Six Centuries Old Is This Sun Temple, Lately Uncovered in the Mesa Verde National Park in Colorado

DISPLAY-TYPE FACES CAST ON SLUGS BY MACHINE

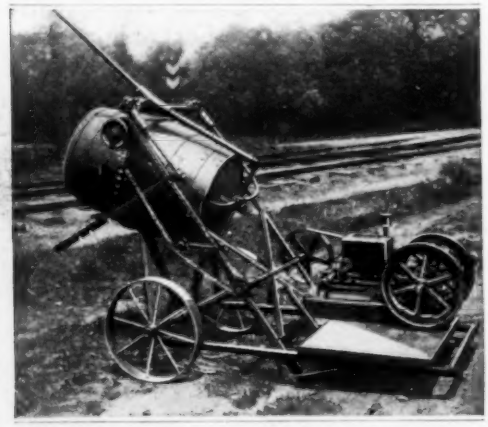
One of the important improvements effected in the printing industry of late has been the invention of a machine for casting display composition on slugs. Some of the advantages are that cost is reduced, an unlimited supply of clean, new type furnished for every piece of work, and time and floor space materially saved. Furthermore, expensive foundry type is conserved, and without reducing the quality of the work. The matrices which are used are set by hand in sticks of a special kind, locked in the machine, and the slug cast. Sticks are made for lines as long as 10½ in., but when these are used, more than one casting is made, the machine taking care of the justification automatically by indenting one slug and overhanging the next. When many duplicates are wanted, as in the cases of blanks, rules, borders, and similar things, the machine will recast until stopped. One large printing establishment has found that the apparatus will produce display work in less time than it can be set from a case, that the elimination of type distribution means a big saving, and that "more matter can be set with $25 worth of 'mats' than with $2,500 worth of foundry type." Two of the machines have replaced three sort casters and 350 cases of type, each weighing about 40 lb., in the composing rooms of one of the big western dailies. This has resulted in a saving of about one-half of the floor space. By the use of angle spaces, italic faces can be used in a line with Gothic or Roman ones, while the readiness with which slugs may be handled greatly simplifies make-up. Forty-eight point matrices are the largest used. The system embodies no departure from the ordinary methods of hand composition.

One of the New Type Machines in Use, and at the Left, the Matrix Cabinet. Below is Shown a Partly Filled Stick, Turned Over so That the Type Matter can be Read from Left to Right, Each Matrix having the Letter It Casts Stamped on the Back. Beneath It Is a Form Made Up of Slugs Cast by the Machine

PORTABLE CONCRETE MIXER OF BARREL PATTERN

Serviceable for the village contractor on small jobs is a portable concrete mixer of the barrel type that is to be brought out this spring. The apparatus is mounted on a substantial angle-iron frame which is provided with a pair of metal wheels at the front. This enables the outfit to be coupled to a truck or wagon as a trailer and

transported over ordinary roads. Power is supplied by a capable gas engine fixed to a platform at the rear of the

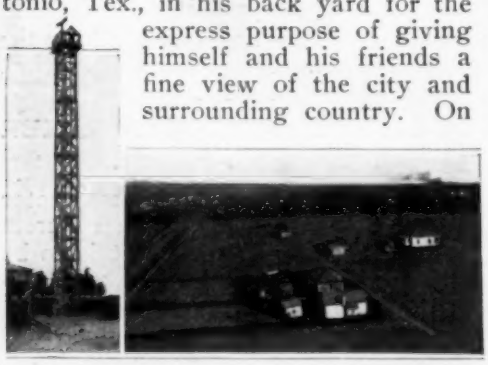


This Portable Mixer will Handle a Wheelbarrow of Concrete at a Time, and can be Carried as a Trailer by a Truck or Wagon

frame. For culvert, curbing, or sidewalk work that requires the services of only five or six men, the equipment is quite adequate and much more satisfactory than an old-style mixing box. Metal baffle plates within the barrel assure the proper mixing of about two and a half cubic feet of material at a time. The mounting is such that the barrel can be revolved while it is tilted to discharge into a wheelbarrow.

OBSERVATION TOWER BUILT IN TEXAS BACK YARD

A private observation tower has been erected by a resident of San Antonio, Tex., in his back yard for the express purpose of giving himself and his friends a fine view of the city and surrounding country. On a clear day a splendid outlook can be gained from this observation point. The structure is 75 ft. high and is surmounted by a railed platform, 7 ft. square, to which access is gained by a ladder. The corner posts of the tower, which is square, are composed of 4 by 4-in. beams, and the bracing members of 1 by 6-in. planks. The framework is kept steady in the face of varying winds by eight ¼-in. cables, which terminate at their lower ends in heavy concrete anchors. Each guy wire is drawn taut by means of a turnbuckle. The builder and owner of the structure contemplates offering it to the government for use as a signal station.



A 75-Foot Observation Tower Built by a Resident of San Antonio, Texas. At the Right is Shown the View from the Summit of the Structure

LATE DISCOVERY SHOWS SUN TO BE VARIABLE STAR

As one result of an exhaustive study of solar radiations by the director of the Smithsonian astrophysical observatory, it has been found that at the earth's mean distance the heat of the sun's rays is sufficient to melt in a year's time a layer of ice 426 ft. in thickness. This, it is announced, indicates that the aggregate heat thrown off by the sun in 12 months amounts to the same as would be obtained by consuming 400 sextillion tons of hard coal. Incidentally, and most fortunately, only a small portion of this tremendous volume of heat reaches us, all but about four ten-billionths of it being lost in space. Another very interesting and important discovery, which is acclaimed the principal result of the investigations, is that the sun is a variable star. The heat emitted by it instead of being constant in intensity, changes from day to day and year to year. It is believed probable that this has a direct bearing upon the climatic conditions of the earth. In the hope of gaining further enlightenment on this score, a South American expedition is to be undertaken this year for the purpose of making additional and more complete observations of solar variation. The work will be undertaken in the most favorable cloudless region.

DANCING WITH DEATH ABOVE THE SKYSCRAPERS

BLOCKING Broadway traffic just for the fun of skylarking—a dazzling, daring wire-walking performance which caused 5,000 persons in City Hall Park to crane their necks and gasp: This is one of the places where composure and strict attention to business count, for it is 250 feet straight down to the nearest pavement. But to this sure-footed girl it is no more difficult to be graceful 22 stories above oblivion than before a sea of opera glasses and a blinding spotlight, except, possibly, when fluffy skirts make a fickle breeze a bit inconvenient. When one is filled with the sickening sense of fear, smiling is far out of the question. But this little maid is really having a rollicking good time of it, laughing and prancing all by herself and happily oblivious of the open-mouthed, nervous New Yorkers far below.

PHOTO BY PACH PHOTO NEWS CO.

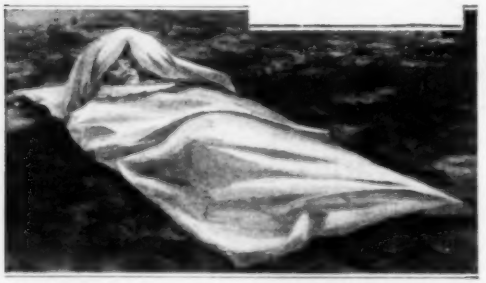
NEW SLEEPING BAG ADOPTED FOR ARMY USE

A sleeping bag with decidedly novel and useful features has been adopted recently by the United States Army upon the recommendation, it is said, of the general commanding the forces along the Mexican border. The bag was designed and is made in Los Angeles, Calif. It is constructed of waterproofed material in two different weights, adapted for different climatic conditions. Though the model for army use weighs only 3 lb., it affords complete protection to the sleeper. The

face is protected by mosquito netting attached to a hood or awning held in place by a small rattan bow. A felt pad, 1 in. thick, contained in a long pocket, serves as a mattress from the

A United States Marine with the Sleeping Bag Folded, Ready to be Placed in the Knapsack

The Man in the Picture, Peering through the Netting, Dons the Sleeping Bag and Disrobes Inside



New Army Sleeping Bag in Use on Sandy Soil: Note the Face of the Sleeper, Visible through the Mosquito Netting

sleeper's shoulders to well below the hip line. There are small pockets for a revolver, watch, flash light, and medicines, etc. The bag is washable, and packs easily into a knapsack.

¶It is proposed permanently to equip an auditorium in Albany, N. Y., with numerous telephone receivers so that, if need be, the entire legislature can sit and hear words spoken by persons in other parts of the country.

SMALL RANGE FINDER MADE FOR GENERAL PURPOSES

Not only of value for army and naval purposes, but also suited for the civil engineer and surveyor, is a short-distance range finder of simple character that has lately been protected by the Swedish patent office. Its fundamental principle is that the degree of the angle, formed by the convergence of the lines of vision, depends upon the distance from the eyes to the object viewed. Held between plain glasses, mounted in a frame or field glass, are two cross hairs whose positions, in relation to the eyes of the observer, are known. In use, the cross hairs are adjusted so that their points of intersection coincide as vision is focused upon a specific object. This action is accomplished with a screw, while the amount of the inward motion is magnified by connection with a drum having a spiral line, on which the reading is made. The instrument is supplied with a saddle and a metal strip, the one straddling the user's nose as a spectacle bridge, and the other being held between the teeth. Its compactness enables one to carry the instrument in a pocket.

HEAT REMOVED FROM LIGHT BY AIR CURRENT

By employing two slightly separated lenses, held in individual mountings, and passing an air current between them, a French authority has been able to free the high-power light of projection machines from the intense heat which has been characteristic of it. The draft of air disperses the heat mechanically and does it so completely that the second lens receives practically a cold light. Objects which are highly sensitive to heat can be exposed to the rays without danger of injury. This makes it possible to use a light of sufficient intensity to permit the reflected projection of the images of different objects in an illuminated room. It also enables the substitution, in the motion-picture industry, of paper ribbons for celluloid films.

The Training of Airmen

by J. G. Gilpatric

ALMOST every one has seen an aeroplane in flight, but with the present-day layman, the interest is centered more on the airman than on the machine with which he does his flying. Naturally, the first question is, "How did he learn to fly?"

Of necessity, the pioneers of aviation taught themselves the then difficult and dangerous art, and all the airmen in the world today owe their flying ability to the Wrights, Blériot, and others of the men who went before. There are flying today a number of airmen who entered the game in the early stages, and who, by luck and perseverance, mastered the art with very little outside assistance. These men were without more than a rudimentary idea of the very principles of flight, and later realized the dangers they had undergone; they knew that the average person could scarcely survive a self-administered course in airmanship. Aviation had come to stay, and a number of firms started regular schools in which the knowledge of the earlier experimenters could be disseminated among the ever-growing numbers of enthusiasts.

An Old-Time Single-Control Machine Flown by a Pupil Who was Well Advanced in His Course

There are three basic methods of teaching flying—the so-called French system, the dual-control system, and a combination of the two largely used today for training war pilots. The French system was the first in general use, and consisted in teaching oneself to fly by the constant criticism, advice, and demonstration of a competent pilot instructor. The pupil was given a heavy, low-powered, and worn-out machine incapable of flying—usually called a "taxi"—and was given practice in running the machine on the ground. In this way he accustomed himself to the speed of an aeroplane, the incessant roar of the motor, and the use of the controls. When the pupil could run down the field in a perfectly straight line, and do it consistently, he was given "hops."

"Hops" were made on a machine but slightly better than the taxi, and consisted in making short jumps across the field at a height of four or five feet. This was the most trying part of the entire course, as at this point smashes were most likely to happen. If the pupil misjudged his height from the ground, or in his enthusiasm tried to stretch his hop into a sustained flight, the ending was usually disastrous. But if he went about mat-

ters sensibly, he would soon be promoted to "straights," or flights in a straight line, about half a mile long. The usual height in this work was 25 or 30 feet from the ground.

Having mastered straights, the pupil was given a fairly respectable aeroplane, and set to making circles. Flying three or four hundred feet from the ground, the pupil would now consider himself a finished airman. If this misapprehension did not make the pupil reckless, and result in a thoroughly smashed machine, the rest of the course would be easy. His landing practice—derived from his ground work—would now be confined to landing on a mark, or trying to. His air work would extend into figures of eight, descents with the motor shut off, and other maneuvers necessary to ordinary flying.

Photograph of Toronto, Canada, Taken from a Dual-Control Machine Used for Training Airmen for the British Air Service

At every step during the course the instructor would show just what he wanted done, and the pupil could profit vastly by emulating him. Finally, when the pupil was considered competent by the instructor, he was sent up to fly for his aero-club license.

The license tests consist of two series of figures of eight flown around two flags placed about 1,000 feet apart, and of making landings within a radius of 160 ft. of a mark on the ground. During the landings the motor must be shut off and the machine handled without power.

The French system had the advantage of instilling self-confidence in the pupil, as he was always alone in the machine. Its disadvantages were chiefly the length of time necessary, and the cost of such a course. The very fact that the pupil was alone prevented work in any but the finest weather, and for their own protection the schools were forced to charge for breakage of the machines. This latter item sometimes ran as high as $1,000, besides the usual $400 for the course itself. Despite the amount of breakage done by careless or headstrong pupils, surprisingly few were injured. From 1912 to 1914 the writer trained nearly 60 pupils by this system without anyone being so much as scratched.

The dual-control system teaches wholly by demonstration and practice in actual air work. A high-powered machine fitted with duplicate controls is used, and the pupil starts by riding with the instructor and watching him work. By simply resting his hands and feet on the controls, the novice can feel the amount of motion necessary to handle the machine. Gradually, the machine is given over to the pupil—the pilot being ever on the alert to correct his mistakes and to demonstrate new points. As the pupil becomes more and more skillful, the pilot requires harder evolutions.

The writer believes in actually demonstrating every condition that may cause the pupil a smash when he finally flies alone, and the remedies to employ

Typical Class at a Modern Flying School: Young Men Particularly are Attracted by Aviation Because It Combines Sport with Work

should such conditions arise. When this work is done at a sufficient height from the ground, so that there is always room to regain control of the machine, it may be done with perfect safety.

The dual-control system of teaching is somewhat hard on the instructor, as it often necessitates five and six hours in the air every day for weeks at a time. The average time in the air required to train a pupil by this method is 400 minutes, which is divided into flights of 20 minutes each. It is now used in this country by all the government schools and the private firms.

The combination, or English, system consists of equal parts of ground work alone and air work with the instructor. As the pupil becomes more advanced, the ground work is gradually dispensed with and air work—still with the instructor—substituted. Finally the pupil flies alone and after some practice is sent for his license.

Flying is not hard to learn. The essential assets are common sense and patience—nothing else is required. If a man has common sense he will realize how safe flying has become, and he will enjoy a reasonable self-confidence. If he is patient, he will not hurry through his course. A slipshod knowledge of flying is more dangerous than none at all. By taking things easy, a month or six weeks spent at a good aviation school will make a raw layman into a fairly well-trained flier—and it will give him the best sport of his entire lifetime.

VACUUM BOTTLE PRINCIPLE USED FOR COFFEEPOT

Designed particularly for the hotel and dining car, but well suited for the home, a vacuum coffeepot, which keeps its contents hot for many hours, is being introduced. Since it is intended for individual service, it is provided in two sizes which hold a trifle more than one and two cupfuls, respectively. The larger pot is about six and a fourth inches in height and, like the other, has a highly polished nickel finish. It is fitted with an all-metal lid which is hinged and ingeniously fitted so that it acts as an air-tight stopper and makes the use of a cork unnecessary. The lines of the pot are shapely, and the inner glass lining is protected against breakage.

¶The supports for a recently constructed New Zealand wharf include 20-ton concrete piles 100 ft. long.

SMOKING OUT FUR-BEARING ANIMALS NOW PROFITABLE

An unusual haul was made by a hunter near Waukon, Ia., last season when he shot 16 skunks which were smoked out of a single den. The practice of smoking out animals is being revived in many parts of the country because of the increase in the price of furs. A smoker now much used consists of three detachable parts: a bellows, a smoke chamber, and a nozzle. The chamber is partly filled with rags, old burlap, or corncobs, to which is added a little sulphur or cayenne pepper. This is set afire and the smoke blown into the den after all exits and air passages, save the one being guarded, have been tightly closed. Ten or 20 minutes' blowing will drive the animals out, weak and dazed, so that they can be killed or captured easily. To avoid waste and rapid depletion of the fur-bearing animals, hunters should kill only well-furred creatures.

View of the Mouth of a Den near Waukon, Iowa, Taken Immediately After 16 Skunks had been Smoked Out and Shot

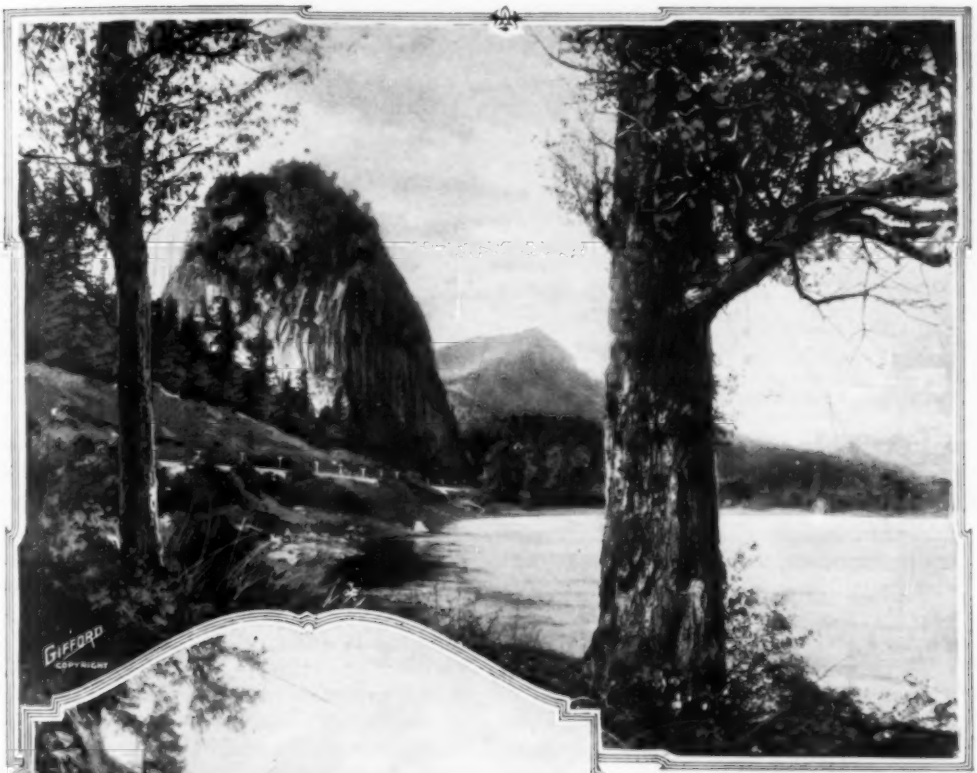
CHAIR IN WHICH PATIENTS RELEARN TO WALK

An invalid's wheel chair has been devised for use by persons who have been temporarily disabled and who must learn over again how to walk. The chair consists of a simple wooden frame, about 5 feet long and 18 inches high, mounted on four wire wheels, and having a cushioned seat at the rear, quite close to the floor. The frame serves as a back and arms for the seat. A patient seated in this chair can either push or pull himself about with his feet, while he grasps the sides with his hands. As he gains strength he can stand between the sides and lean on them as he walks. Practice of this sort is designed eventually to restore to the patient the normal use of his limbs.

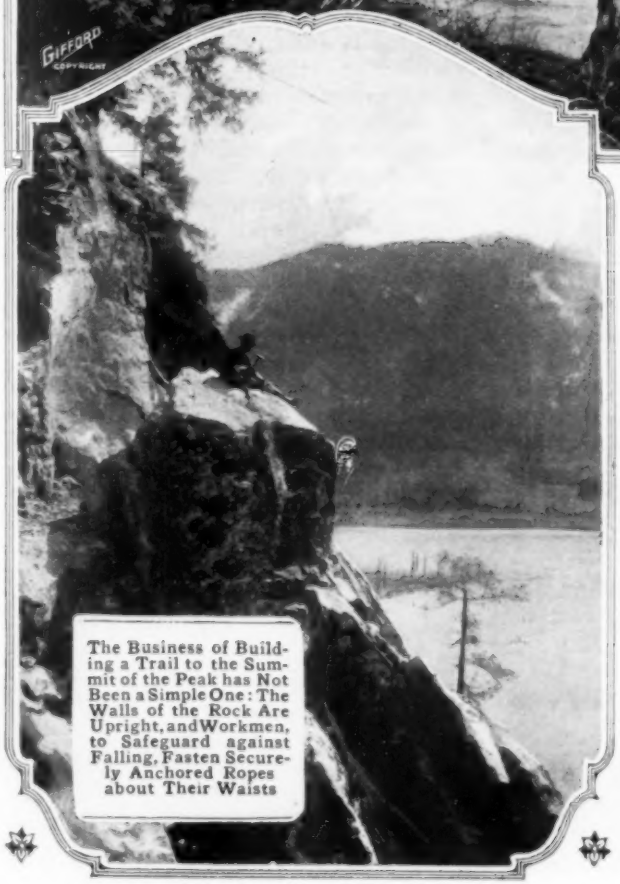
Chair Designed for Convalescents Who must Learn to Walk Again: The Patient can Push Himself About with His Feet or Walk Leaning on the Sides of the Chair

SCENERY LOVER BUYS PEAK AND CUTS TRAIL TO TOP

In order that a picturesque pinnacle overlooking the Columbia River might be preserved, a westerner some time ago purchased it from a contractor who was making preparations to quarry its stone for building purposes. Since then the man has expended $20,000 in blasting and carving a trail part of the way up the precipitous walls of the peak toward the summit, which is



A View of "Castle Rock," Overlooking the Columbia River, Which Gives One an Idea of the Magnificent Character of the Local Scenery



The Business of Building a Trail to the Summit of the Peak has Not Been a Simple One: The Walls of the Rock Are Upright, and Workmen, to Safeguard against Falling, Fasten Securely Anchored Ropes about Their Waists

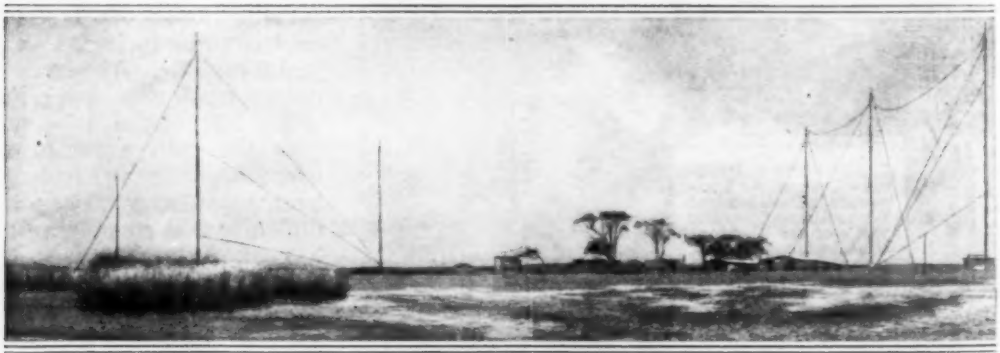
about 850 ft. in height. When completed, this path, some four feet in width, will be nearly a mile in length and represent an investment of about $30,000. It doubles back about 50 times in making the ascent, and at each of these turns is level and 8 ft. wide. At narrow points, reinforced-concrete slabs have been laid to give the path a uniform breadth. The work has been attended with much difficulty and considerable hazard. When the task is finally finished, the trail, from which a magnificent view is afforded, will be open for the public to enjoy without charge.

Panoramic View of the Mast Line of the New High-Power Radio Station at Koko Head, Hawaii, Which by the Company for Its Employes. Koko Head, an Extinct Volcano, is Shown at the Extreme

BIG RADIO STATIONS LINK EAST WITH WEST

Within the last few months another important link in the around-the-world chain of high-power wireless plants has been forged. The opening of the new radio station at Funabashi, near Tokyo, has connected the Orient with the Occident and reduced the minimum rate for trans-Pacific commercial communications from $1.21 a word—the cable charge—to 40 cents. At present the Japanese-United States service is confined to San Francisco, Hawaii, and Japan. The distance between the Golden Gate plant and that at Kahuku, Hawaii, is 2,087 miles, while in jumping from the latter place to the Japanese station the waves travel 4,140 miles.

It probably is unknown to the majority of persons that Hawaii boasts two separate high-power radio plants. Both are included in the general system, but for the present only one of them is regularly used in the East-and-West service. At Koko Head, about 10 miles from Honolulu, one of these stations is situated. It was originally planned as the receiving station in Hawaii, but is now used only as the demands of service require. Its erection presented several knotty engineering problems, not the least of which was the transportation of materials. The Japanese aerial towers at this station are interesting. The first two are 430 ft. high and of sectional type. From the latter one, the aerial makes a span of 2,000 ft. to the top of Koko Head, an extinct volcano of 1,194-ft. elevation. Sufficient room was not available for a sectional mast there, so a self-supporting tower was erected



At the Present Time the Wireless Station at Kahuku, Hawaii, Which is Claimed to Be the Largest One in the Japanese and San Francisco Aerials, and the Masts for the Former Each Have a Height of

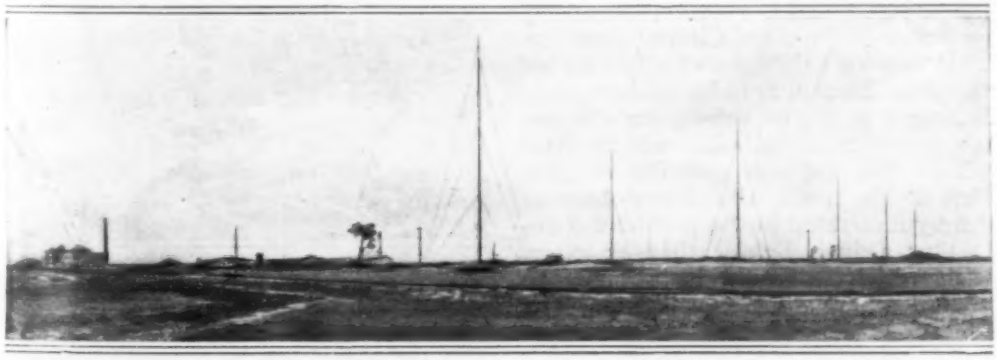
Is But a Few Miles from Honolulu. The Building Which is Included in the Picture Is a Hotel Erected Right, and on Its Summit, Faintly Visible, Is One of the Towers Supporting the Japanese Aerial

and the anchorage established far down inside the crater. The balancing aerial is on self-supporting towers situated in a pond where it was necessary to sink caissons to establish foundations. The Hawaiian station at Kahuku, the northernmost point of Oahu, is claimed to be the largest wireless plant in operation. It is both a sending and receiving station. Here the San Francisco sending aerial is supported by 12 masts, each 325 ft. in height. The Japanese aerial is also held by a dozen towers, but the height of each is 475 feet.

The idea of circling the globe with wireless plants was evolved about four years ago. It has brought about the erection of the New Jersey stations at New Brunswick and Belmar, which work with corresponding stations in England, and the construction of sending and receiving plants at Bolinas and Marshall, Calif., which link the Pacific coast with the Koko Head and Kahuku installations and two similar plants to be established at Manila. Stations planned for Marion and Chatham, Mass., are to connect with Stavanger and Naerbo in Norway. The Funabashi station is controlled by the Japanese government and has both civil and military operating staffs.

CROCHETED MODEL OF LAWN MOWER SENT TO ATTORNEY

One of the many patent attorneys at Washington was recently the recipient of a most unusual model of a device for which a client sought protection. It was a crocheted reproduction in the miniature of a motor-driven lawn mower invented by a California woman. Being proficient in needlework, but not in drafting, she crocheted a model of



Operation, is Employed Both as a Sending and Receiving Plant. Here 24 Towers are Used in Supporting 475 Feet. This Station Is the Radio Connecting Link between the Orient and the Occident

the mower and its propulsion attachment. Every part of the machine was reproduced in her extremely novel piece of needlework, which was subsequently

Even the Grease Cups and Oil Holes of the Machine are Shown in This Queerest of Models, Recently Received by a Washington Patent Attorney from a Woman Client

starched—so that it would have shape as well as the strength to stand alone—and dispatched to the capital. Her work was so well executed that a draftsman experienced no trouble in making detailed drawings of the invention.

BIG GIFT FOR DISCOVERY OF LIGHT AIRSHIP FUEL

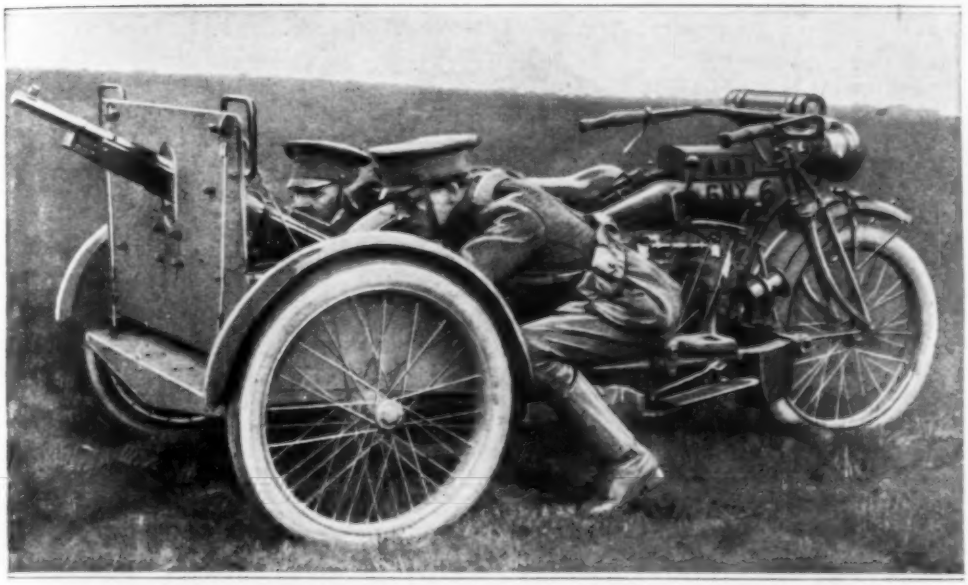
A $10,000 bequest, which at some future time may produce revolutionary changes in the development of aerial navigation, was included in the will of the late Samuel H. Valentine, formerly governor of the Aero Club of America. This veteran aviation enthusiast willed this sum to the club to be used in establishing a prize, or prizes, for the encouragement of the builders of air craft which will not use gasoline as fuel. Before his death the donor became deeply interested in the problem of obtaining a fuel, lighter than gasoline, with which it would be possible to make longer aeroplane flights. The conditions under which the money is to be awarded are left entirely with the Aero Club.

SHEET-METAL SPLINT NEW FIRST-AID ACCESSORY

Telescoping sheet-metal splints, suited particularly for emergency purposes, have been invented by a Virginia surgeon. They are semicylindrical in shape and provided in three 12-in. sections, the longitudinal edges of which are flanged so that one segment fits into another, and the three, when extended, are held together rigidly. When the separate members are compactly telescoped, a package a foot in length, holding bandages, adhesive tape, pins, scissors, tissue, and other first-aid supplies, is formed. The sections are used according to the conditions presented. One segment, for instance, is sufficient when a fracture of the forearm, head, or ribs is given attention. Two of them, disjointed, are used if a whole arm needs support, while all of them are fitted together to form a splint for a broken leg. Parallel slits in the metal permit strips of

Showing Two Sections of the Metal Splint Applied to a Fractured Arm

bandage to be passed through so that the splint can be securely tied in position.



Machine-Gun Outfit Recently Acquired by the First Armored Motor Battery of New York

MOTORCYCLE GUN CARRIAGE MOUNTS RIFLE AND SHIELD

A motorcycle machine-gun outfit, recently provided the First Armored Motor Battery of New York, has a number of unusual features. The gun carriage is attached as a trailer to a twin-cylinder machine of standard make, and mounts a two-part shield. The latter is so pivoted that the operator is afforded full protection when turning the rifle horizontally. The upper part of the shield is independent of the bottom, and turns with the gun, while the armor is 2 in. thick and will stop rifle bullets at 50 yd. A very simple contrivance holds the gun and shield in place and enables them to be demounted from the carriage in about a half minute. Two legs, hinged to the ends of the bracket which serves as the pivotal mounting for the upper and lower sections of the shield, permit the unit to be used at any angle when placed in firing position on the ground. A solid base for the gun and armor member is formed when the legs are locked. Handles are provided at the top on opposite sides so that two men can carry the unit to a desired place after removing it from the trailer. Intrenching tools are strapped to the rods connecting the motorcycle and carriage.

WINDING INDICATOR FOR WATCHES

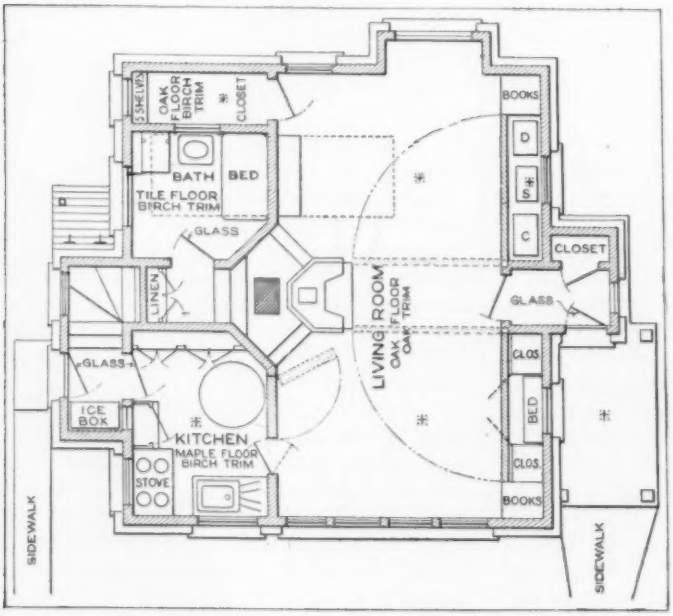
The tendency to overwind a watch, or on the other hand, not to wind it often enough, has been provided against by a winding indicator with which certain high-grade watches are now being equipped. A dial resembling the second-hand dial, is situated immediately below the figure 12 on these timepieces and is provided with a small hand that slowly revolves to the right or left according as the spring is being wound or unwound, its position indicating how near the watch is to being run down. The device serves as a safeguard against too tight winding.

Not Half so Big as Many Private Garages, yet Possessing the Conveniences of a Residence with Five Large Rooms, This Little House Is Brimful of Striking Features. Hardly a Square Inch of Its Space is Wasted

COMPACT BUNGALOW WITH FOLDING ROOMS

WHEN distinctive qualities embody character and promote comfort, an unusual residence fosters interest. That is the way with a small brick bungalow at Evanston, Ill., a house of swinging walls and disappearing rooms, that has amazed all who have examined it. It is a tiny, sun-flooded "doll's house" with light walls, white woodwork, and attractive, simple hangings.

The bungalow has been erected by a Chicago designer of uncommon dwellings, for the purpose of trying out an idea fundamentally intended for incorporation in city apartments. Its outside dimensions, not including the protuberances, are about 27 by 25 feet. Yet it is a five-room house with a living room, approximately 13 by 25 feet in size; two bedchambers, about 10½ by 14½ feet and 10 by 14½ feet, respectively; a dining room, 10 by 14½ feet, and a kitchen, 7½ by 10½ feet, as well as a toilet room, small hall, one very roomy closet, and a kitchen entryway which accommodates a refrigerator.



The Arrangement of the Bungalow as Well as an Exposition of the Interesting Ideas It Embodies, are Afforded by the Floor Plan Above

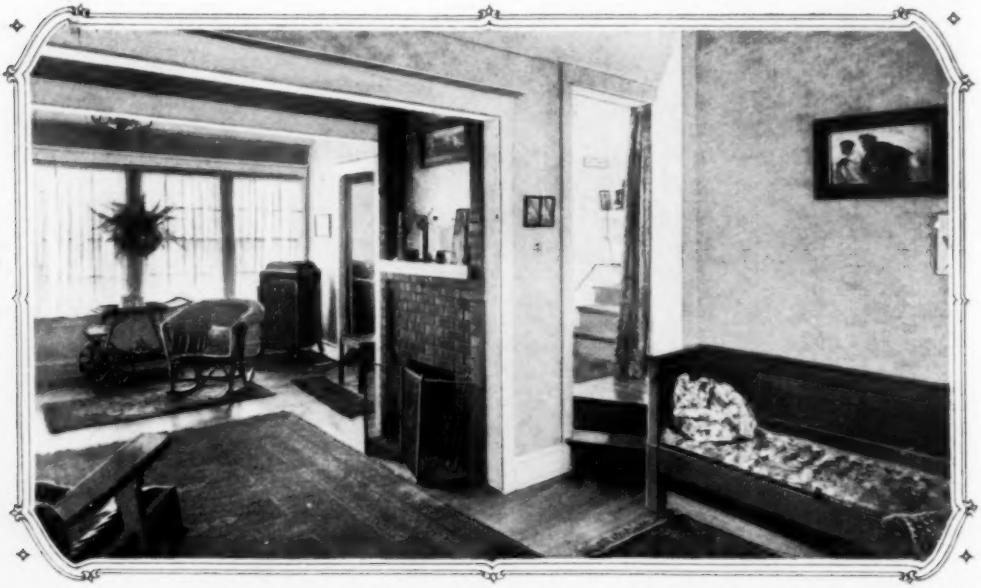
Swinging walls are the secret of all this. The little house is really divided into a living room and kitchen. But only a trifle more time and energy are required in unfolding a fully furnished bedchamber, or a dining room, than attends the opening or closing of a door. The north walls of the living room — which are separated by a doorway opening into a small reception hall—are hung on hinges and supported by heavy ball-bearing rollers. Firmly attached to the wall in the west half of the room, its legs reaching to within a half inch of the floor, is a library table. On the other partition is a writing desk. Concealed behind the former wall are a dresser, chiffonier, and sewing machine. When this wall is swung back to form a bedroom, it fits the beamed opening extending from the hall doorway to the fireplace, and decreases the length of the living room to about 14 feet. A bed, to the foot of which a bench is attached, is then drawn out from the opposite wall. A doorway in one corner gives access to and from the other rooms.

Showing the Full Size of the Living Room. The North Walls—at Right—Swing as Indicated, While Doorway Opens into Small Reception Hall

This Is How the Living Room Appears When That Part of It Shown in the Background of the Picture Above is Used as a Bedchamber

The other—the east—end of the living room is converted into a dining room by a similar operation. When the wall in

By Opening the Wall and Drawing Out a Settee, This Light, Roomy Bedchamber is Provided. At Other Times Its Furniture is Hidden



The South Wall and East Exposure of the Living Room: At the Right Is the Settee Attached to One End of the Disappearing Bed. The Doorway Leads to the Bath, While That Adjacent to the Phonograph Opens into the Kitchen

that half of the room is opened back and fastened in place beneath another beam, extending parallel with the first-mentioned one, an attractive built-in china closet is disclosed, and a real dining room provided. Obviously, at such times the west end of the main room becomes the living room. And in this connection it will be observed that the fireplace, library table, and writing desk always appear in the living room, regardless of how the latter is formed. Another hinged wall, this on the south side of what has now become the dining room, permits the dining table to be moved in from the kitchen. Two glass doors in the middle of the china cabinet disclose a wall bed of full size, when opened. As in the other case, a doorway in one corner gives access to a couple of steps which extend to a landing, whence one reaches the toilet room, which is elevated a few feet, on the other side of the temporary partition. The ceilings in the living room, on either side of the beams, are vaulted. This gives space for a couple of small windows at the top of the room.

Surprising Dining Room Formed in 10 Seconds by Shutting Off East End of Living Room. Doors in the Middle Hide Another Bed

It cost about $2,200 to erect this house. Application for patents has been made by the architect.

KILL RATS UNDER JAIL WITH BOILING WATER

Vast numbers of rats, which have infested the Los Angeles city jail, are believed to have been killed by injecting boiling water into the network of little tunnels which the rodents had made under the building. On one occasion approximately 5,000 gallons of water was drawn from the heating boilers in the basement for this purpose. The unusual procedure was repeated several times. It was the theory of those who worked out this plan that not only would the water scald or drown the animals but they would be satisfactorily buried by the caving in of their passageways.

HOT COFFEE SERVED ON TRAINS IN PAPER CUPS

The selling of hot coffee in the day coaches of certain trains on the Chicago, Milwaukee, and St. Paul Railway is an innovation which has proven popular with persons taking short trips at night and those who do not care to patronize the diner. The coffee is served from a tray by the news agent, in tall cups of durable paper composition. The cups taper toward the top so that their contents do not spill easily. When they have been used once they are discarded.

Serving Hot Coffee in a Day Coach: An Innovation Recently Introduced on a Western Railway. The Beverage is Contained in Sanitary Paper Cups That are Thrown Away after being Used Once

LARGE STATUE OF LINCOLN PRESENTED TO OHIO CITY

Within a short time a new full-length statue of Abraham Lincoln will be

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Massive Sculptured Head of New Lincoln Statue Which is to be Erected in a Cincinnati Park

erected in Sinton Park at Cincinnati. It is the work of George Bernhard and a gift to the city by a woman of considerable prominence. The figure is in bronze and is intended to rival the late Augustus Saint-Gaudens' famous conception of the martyred president which was unveiled in Lincoln Park at Chicago about 30 years ago. It is of colossal size and great weight, and is said to be valued at $100,000.

¶One of the electric locomotives employed on a section of a western railway which has been electrified, recently made an exceptional run of 339 miles without receiving any special attention en route and at the end of the journey was in condition for the return trip.

SAFETY-FIRST CALENDAR FOR SCHOOLROOMS

A calendar designed especially for schoolrooms is a feature recently introduced in the safety-first agitation by

A Calendar Which Warns School Children against Trespassing on Railroad Tracks and Gives Some Appalling Accident Statistics

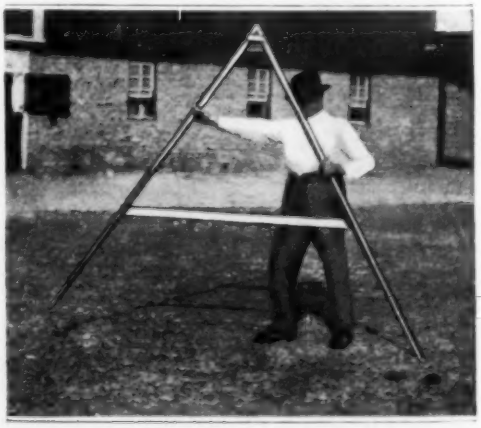
an eastern railroad. It is intended especially to warn children and adults against trespassing. The upper part is occupied by a picture, entitled "The Dangerous Shortcut," and depicts school children crossing a railroad track on which a train is swiftly approaching, when they could have used a near-by bridge. Various safety-first admonitions are printed on the leaves for the various months. Boys are particularly warned against jumping onto moving trains. The calendar also contains some appalling accident statistics.

NEW TYPE OF RABBIT IN WESTERN KANSAS

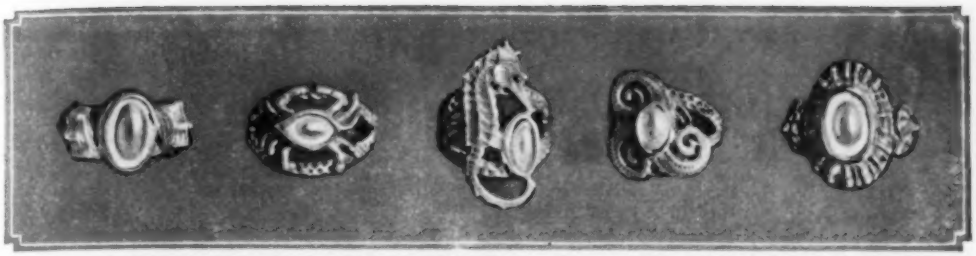
From western Kansas comes a report that a new breed of rabbits has appeared in great numbers in several counties. The animals have been called "Bel-rabbits" because it is believed that they are a cross between jack rabbits and Belgian hares. About three years ago two crates containing Belgian hares, which were being shipped to Colorado, were damaged, and the animals escaped across the Kansas plains. The interbreeding of these creatures with the native rabbits is regarded as the beginning of the new type. The Bel-rabbit is described as being more heavily built than a jack rabbit and hence less fleet, so that occasionally a boy can run one down. As food the animals are very palatable and lack the strong flavor which characterizes the variety native to Kansas. They are fond of many vegetables which jack rabbits do not eat.

LARGE MEASURING "COMPASS" USED FOR FARM PURPOSES

Few linear-measuring devices are so queer either in appearance or method of use as is a contrivance employed by an Illinois man. It consists of two poles, joined like the legs of a draftsman's compass, and so set that they have a span of 8 ft. 3 in.—one-half rod. For determining distances or computing areas the device is held in both hands and swung so as to describe a continuous series of semicircles; pains, of course, being taken to follow as nearly as possible a straight line. This operation can be performed without difficulty while walking at an easy gait. Although only approximately correct estimates can be made in this way, the results are sufficiently accurate for ordinary purposes on a farm.



When Only Approximately Correct Results are Needed, This Strange-Looking "Compass" can be Used in Measuring Distances and Estimating Areas



Five Rings in Rare Design: The Mountings are Formed of Silverized Sea Growths, While the Settings Are Submerged Pearls That Appear Convex but Are Really Perfectly Flat

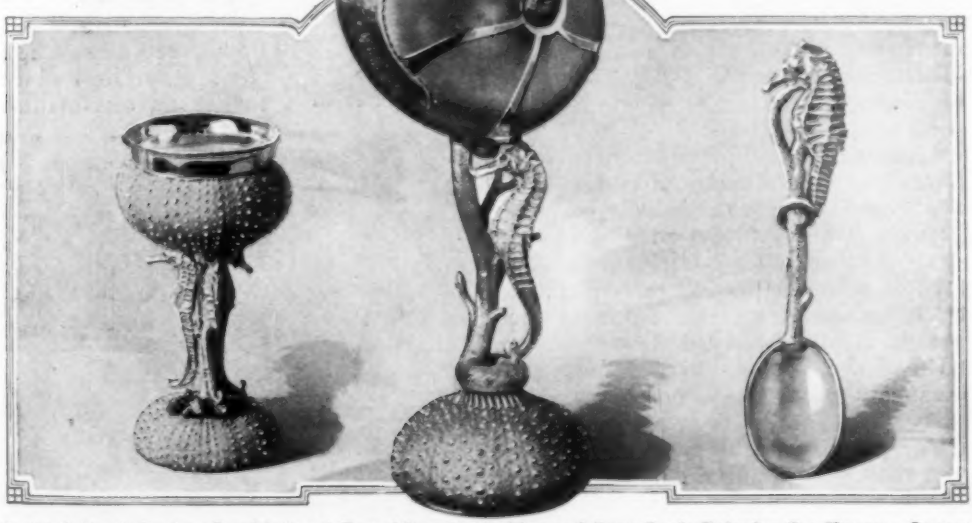
MARINE DESIGNS IN JEWELRY AND NOVELTIES

By RUTH K. RICE

IN the making of artistic novelties, a craftsman of Baltimore uses real shells, coral, or some other product of the sea. Each piece is unique, since nature fashions no two things exactly alike, and each must be constructed as the material at hand allows.

This artist's studio is a most interesting place, for in it are gathered together from all parts of the world many unusual specimens as well as quantities of the well-known varieties of the shell family. Among them are marlinespikes from India, mottled brown and cream shells that resemble the sailor's tool of that name. From the Mediterranean come turban shells, marked like a grouse's back. Rainbow-tinted abalone and translucent pearl shells occupy a corner of their own. There are also tantalizing submerged pearls that appear to be convex and are in reality perfectly flat. These are often set in rings or pins between two tiny snail or clam shells coated with silver. For similar uses are

A Sea Urchin and a Little Sea Horse, Treated by Electricity to a Bath of Silver, Make This Candlestick



Left: A Small Loving Cup Made of Two Silvered Urchins and Some Luck-Bringing Sea Horses. Center: A Shell Loving Cup; the Bowl Is a Superb Chambered Nautilus. Right: A Unique Spoon, Having a Pearl-Shell Bowl and a Sea Horse Mounted on a Silvered-Coral Handle

A Candlestick Made of Sea Urchins, a Sea Horse, and Bits of Coral

the dainty shell cameos. The clever Japanese utilize each differing tint of the separate layers of shell substance in producing most realistic effects. From a pink or lavender background, about the size of a dime, stand out tiny bunches of cherry blossoms or wistaria, flying birds, or other designs.

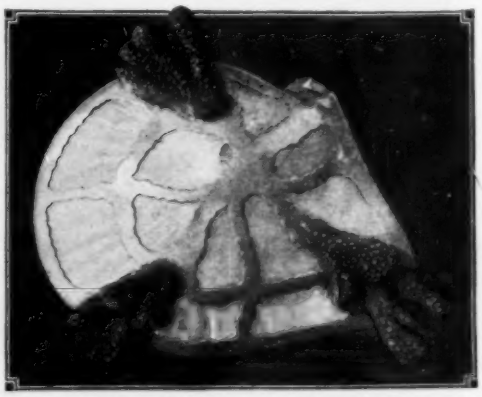
As each new article is to be made the possible materials are assembled. These are combined and rearranged until a satisfying result is obtained, which is photographed for a working design. Then silver is deposited by an electrical process wherever it is wanted. Sometimes the entire shell is covered with the metal, without destroying any of the natural markings. Again only a back or a latticework of silver is needed to render the article substantial. The union of the parts is also effected by electricity.

The large prickly sea urchins are transformed into sugar bowls or powder boxes. The upper section is sliced off for a cover, to be lifted by a tiny snail shell. Both parts are treated to a bath of silver and given a French-gray finish. Small urchins conceal inkwells or are combined in various ways to make candlesticks. Sometimes a silvered sea horse forms the handle, and again one of these weird beasts reclines against a coral rod that supports a cuplike urchin just the right size to hold a candle.

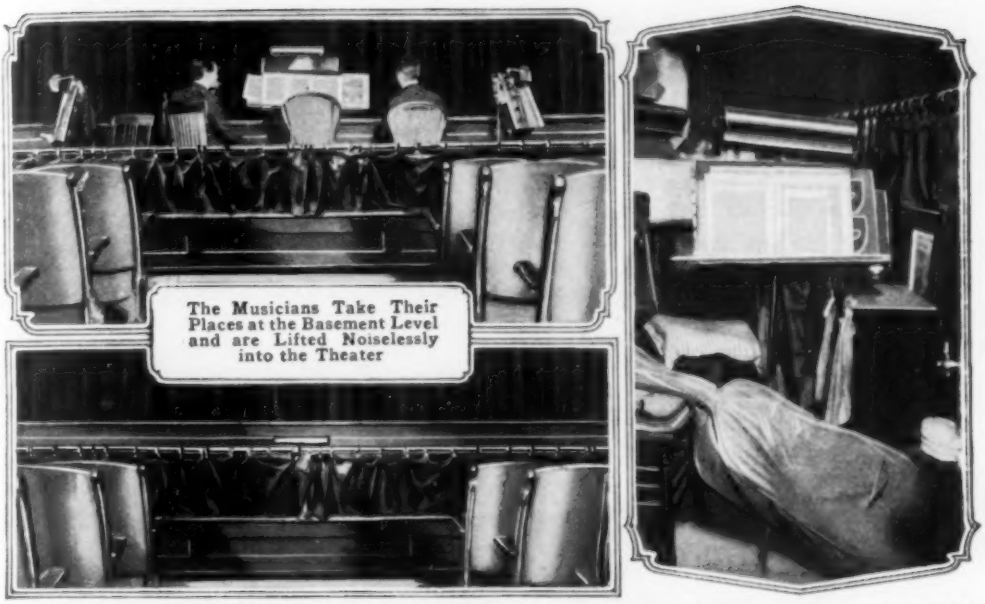
Loving cups made of shells are most appropriate trophies for yacht races and water sports. A handsome one recently presented was composed of 23 shells. Five large British scallops of pinkish tint surrounded a silver-gilt bowl that would hold three quarts of liquid. Smaller shells filled the intervening spaces. It rested on a silvered urchin upheld by three polished marlinespikes. The base was another urchin surmounted by a group of rare shells.

The Lotus Electrolier: The Base is Composed of Three Scallop Shells and Three Marlinespikes, from Which Rises a Gracefully Arched Lily Stem of Dull Silver, Ending in a Single Lotus Blossom with Pearl-Shell Petals

But the wonderfully beautiful colorings can only be appreciated when shells are used as shades to conceal electric bulbs. Pieces of pearl shell, cut thin and highly polished, are arranged to simulate the petals of lotus blossoms. One such flower completed by a gracefully arched lily stem of dull silver makes an ornamental



The Back of a Shell Tray: It Has a Latticework of Silver to Which are Attached the Silverized Coral Legs



In the Lower Picture the Orchestra Pit has been Dropped from View into the Position Shown at the Right, Where It is Seen About Halfway Down the Shaft

desk light. Several blossoms peeping over the edge of a copper bowl, to be suspended from the ceiling, will brighten a whole room. The artist has also arranged attractive shades of four or six scallop shells. As nature conveniently supplies these in a variety of colors, they can be had to harmonize with the color scheme of almost any room.

ELEVATOR ORCHESTRA PIT USED IN MOVIE HOUSE

One of Los Angeles' many photoplay houses has lately installed a disappearing orchestra pit which enables the musicians to make their appearance and departure en masse without clambering through the tiny hatch beneath the stage and thereby occasionally distracting an audience. A platform on which a piano, a number of chairs, the music racks, and the traps are arranged in the conventional manner, is raised and lowered by elevator mechanism of the plunger type. The members of the orchestra take their places at the basement level. The machinery does the rest, lifting the platform and its occupants to the curtained-off area in the auditorium, immediately in front of the stage. The device was installed at a cost of about $1,500, and the expense of operating it has been found very moderate.

SIMPLE DEVICE FOR SEALING ENVELOPES

A simple labor-saving device for an office is an envelope sealer which does away with the use of insanitary sponges, and the like. With it one person can seal as many as 50 letters a minute. The sealer is provided with a handle about the length and diameter of a fountain pen. To this is attached the member that moistens and seals the flap of the envelope, and in it is a narrow slit into which the flap is inserted, whereupon the single operation of drawing it from one end of the envelope to the other, serves to wet the gum and press the moist edge against the body of the letter. There is little in the device to get out of order.

MEMORIAL SHAFT ERECTED TO UNSUNG HEROES

At the Princes Pier Head in Liverpool, a granite monument has been erected in memory of the valiant deeds of the engine-room heroes of the British navy. In addition to the interest the memorial attracts as a work of art, it is notable for two things. It is one of the very few shafts that have ever been raised anywhere in honor of the many courageous seagoing engineers, mechanics, and coworkers who have stuck to their posts in the face of death and performed their duties with self-sacrificing patriotism equal to that of any soldier or sailor. The other noteworthy point is that the memorial is the only important English work of its type that has ever been executed solely in granite. It is 48 ft. in height and consists of an obelisk surmounting a heavy base, on two sides of which are sculptured groups representing the different divisions in the personnel of an engine-room staff. The other two sides of the rectangular support carry inscriptions. At the corners of the top part of the base are four figures symbolical of earth, air, fire, and water. Behind these figures and supposedly supported by them is a sea-circumscribed globe, on each side at the back of which a flaming sun is visible. A group of lightly draped feminine figures, holding wreaths, crown the shaft, which at the apex is surmounted by a fiery torch.

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On Two Sides of the Base Are Sculptured Groups Representing the Different Divisions in the Personnel of an Engine-Room Staff

STORAGE-BATTERY TRACTOR TO DISPLACE HAND TRUCKS

A small storage-battery truck is now being made for indoor and platform hauling which greatly reduces the cost of handling freight, or other material, and is designed especially for large manufacturing or wholesale plants. It is used as a tractor

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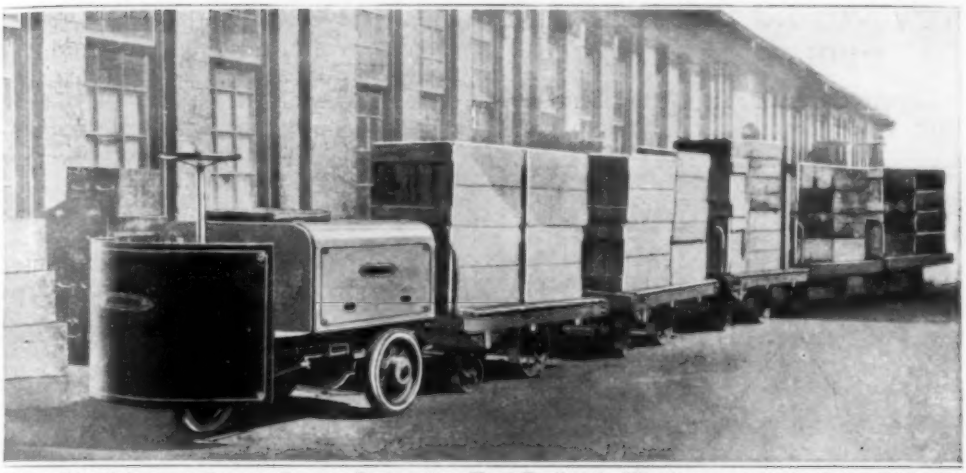
This Memorial, the First Important English Work of Its Kind to be Executed Entirely in Granite, has been Raised in Honor of the Engine-Room Heroes of the British Navy



Three-Wheel Storage-Battery Tractor Designed to Haul Trailers in Warehouses, and the Like: With One of These Trains a Few Men can Do Work Which would Require a Large Gang If Hand Trucks were Used

and can draw four or five loaded trailers. The truck has three wheels and is equipped with an automobile steering wheel and a worm-gear drive. Its short turning radius makes it adapted for use on freight-depot platforms and in storerooms where there is limited space in which to move about. A few men and a train, composed of one of these tractors and several trailers, can do the work which otherwise would require a large gang of men using hand trucks. It is claimed that in some cases this storage-battery tractor will pay for itself in a few months.

LUMBERMEN'S METHODS USED IN FELLING STANDPIPE

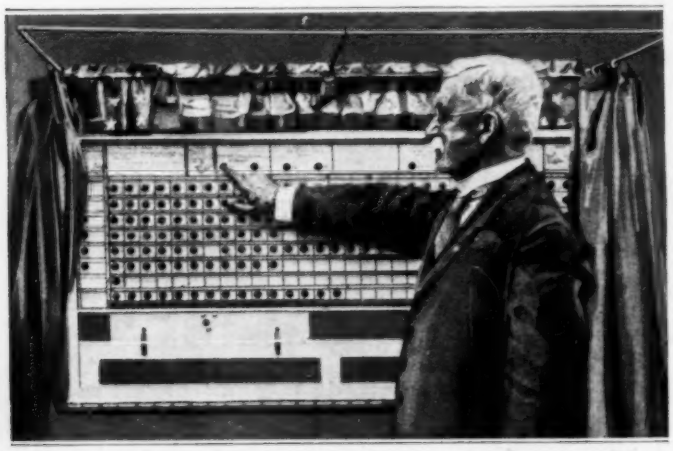
When it became necessary some time ago to remove a 110-ft. standpipe at Hampton, Ia., which for a quarter of a century had served as a reservoir for the municipality's water supply, the task was accomplished in a manner closely similar to the felling of a giant tree. The big steel tank stood in the central part of the city before a public building and immediately adjacent to a street. A safety zone was established, traffic suspended, and the work accomplished quickly. A cable was attached to the upper part of the structure and one side of the foundation removed. A heavy, steady pull on the steel rope did the work. The tank tilted in the direction the cable was stretched, wavered for a fraction of a second, then crashed with a resounding roar into the street,

After One Side of the Foundation had been Removed, a Steady Pull on a Cable Attached near the Top of the Structure Caused the 110-Foot Standpipe to Crash into the Street

almost exactly in the position that had been contemplated. The work was witnessed by a large crowd of onlookers that jammed the near-by streets.

NEW VOTING MACHINE USED IN CLASS ELECTION

When the students of an Ohio college voted recently for class officers, their ballots were recorded and counted by a voting machine of new design. Two students had charge of the machine and reported the result of the election within three minutes after the polls were closed. The new machine, which has been patented, is the fourth model made by the inventor, who has been working on the problem for 15 years. It is constructed entirely of light material, almost all aluminum, and is housed in an aluminum case, 2 ft. high, 10 in. deep, and from 4 ft. long to any greater length required by the ballot. In operation, an official ballot is fastened on the face of the machine, within a booth, the ballot being perforated to fit over push buttons which appear above the names of the candidates. The voter casts his ballot by pushing the buttons of his choice and the mechanism does the rest.



Australian-Ballot Voting Machine, the Invention of an Ohioan, Recently Used by College Students to Elect Class Officers

WATER MAINS OF WOOD PLACED OVERHEAD

A strange example of waterworks engineering is to be found in central Mexico in the picturesque city of Uruapan, state of Michoacan. Water is conveyed from an elevated storage reservoir to various parts of the city through square wooden pipes which serve as water mains. Instead of laying these in or on the ground, they are elevated above the streets in many places, so that pedestrians, animals, and even the street cars, which are not large, can pass under them. Another unusual feature of this water system is that these pipes pass right through houses and places of business in a seemingly very hit-or-miss fashion. It is said that the inhabitants were so glad to have the water brought to them that they were willing to put up with the inconvenience of the pipes.

Street Scene in City of Uruapan, Mexico, Showing Square Wooden Water Main Which is Raised Several Feet above Ground and Penetrates the Houses on Either Side of the Thoroughfare

SETTING THE STAGE FOR ARMY AND NAVY GAME

Plowing through New York Harbor past the Statue of Liberty, the Advance Guard of the Atlantic Fleet Coming In for the Big Event, the Annual Army and Navy Football Game: Following the "New York," Which Heads the Procession, Are the "Texas," "Oklahoma," "Connecticut," "Florida," "Utah," and "Wyoming"

One of the Time-Honored Ceremonies Observed Before the Whistle is Blown for the Kick-Off: The Firing of the Salute. Here, before a Throng of 50,000 Expectant Rooters, All Is Ready for the Cannon to Speak

Future Officers of the United States Army, West Point Cadets, at the Polo Ground, before the Opening of the Hard-Fought Gridiron Battle with the Middies from Annapolis, Who Went Down to Defeat after Putting Up a Sporty, Determined Fight for the Honors of the Day

CAR'S FUEL CONSUMPTION SHOWN BY SPECIAL GAUGE

In view of the high price of gasoline the amount of fuel which an automobile consumes is becoming an increasingly important consideration in the purchase of a car. Accordingly an automobile salesman in Los Angeles has constructed a device which enables him to show conclusively just the amount of fuel his car will use in a given distance. It consists of a ½-gal. gasoline tank and a glass gauge which are attached near the windshield, in full view of the passengers, and connected with the carburetor into which the fuel feeds directly. The salesman claims that the make of car he sells will travel 18 miles on a gallon of gasoline. To prove this he has marked off the gauge into nine equal parts, each equivalent to a mile of travel, according to his claim. By comparing the gauge with the distance covered, anyone can ascertain if the fuel consumption of the car is as stated.

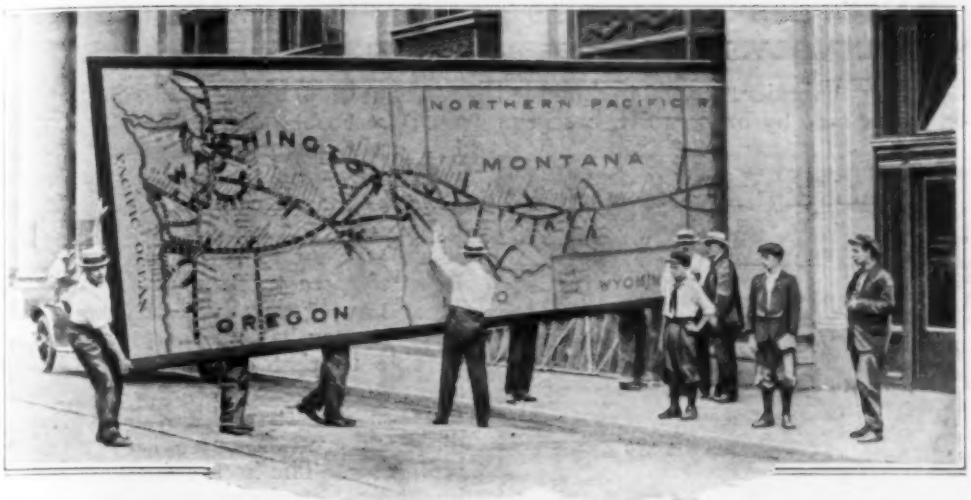
AIRMEN NOW HAVE SUPPORT OF MOTORCYCLE CORPS

Fourteen high-powered motorcycles, each with sidecar equipment, have been purchased by the War Department to form an auxiliary arm of the aviation corps. Among other uses, they are employed to transport mechanicians quickly to different points when aeroplanes, because of mechanical trouble, have to make forced landings. They are also used for rushing supplies relatively short distances. Each machine is enameled an olive-drab color of somewhat lighter shade than other cycles in the army service, and bears the insignia of the aviation section. They have been assigned to the fliers now at the Mexican border.

TYPEWRITER MARKS BOXES OR PACKAGES

A typewriter of new design for marking or addressing packages and boxes by writing directly upon them, and also for printing bulletins or show cards in various sizes of type, has been produced by an Indiana inventor. The platen furnished with the machine has a flat surface and is mounted detachably behind a type wheel carrying both upper and lower-case letters and operated by a set of keys similar to those of the standard keyboard. The flat platen comprises an arrangement for holding and moving paper or cardboard to be written on, and also for line spacing. When a package or box is to be addressed or marked, the regular platen is removed from its supporting platform, which resembles a camera stand, and the package or box is set in its place, being raised sufficiently by a foot lever to bring that portion on which it is desired to write into the proper position behind the type wheel. By the use of wheels of different sizes, which the design permits, it is possible to write in characters varying greatly in size and style.

Boxes and Packages may be Marked or Addressed by Writing Directly on Them with This New Typewriter: The Surface to be Written On is Placed behind the Type Wheel in the Position Occupied by the Removable Platen Seen in the Photograph



One End of a Big Map of the States of the Northwest, Which has been Installed in the Immigration Department of the Northern Pacific Railway Offices at St. Paul

RAILWAY MAP SIXTY-NINE FEET LONG

A railway map of enormous size was recently installed in the immigration department of the Northern Pacific Railway offices in St. Paul. It measures 69 ft. long and 11 ft. wide and required the services of nearly a dozen men to carry it. The map shows that portion of the United States between the eastern boundary of Minnesota and the Pacific coast, and the entire Northern Pacific Railway system, including practically every station on the line. The whole representation is done on such a large scale that even the lettering used in the names of the smallest towns can be easily read several feet away.

TRAIL-MEASURING WHEEL USED BY FORESTERS

A front bicycle wheel, equipped with a suitable handle and a cyclometer, is now employed in a number of the national forests of the West in measuring trails. There are about 22,000 miles of trails, old and new, in these reserved areas, and it is the aim of the Forest Service to measure many of them and mark them with mileposts and other signs. The cyclometer registers miles and tenths of a mile. The wheel is fitted with a cushion tire so there is no danger of punctures. One ranger pushing this simple outfit through the forest can measure more trail in a day than two men with a surveyor's chain.

A Bicycle Wheel Equipped with a Handle and Cyclometer, with Which a Forest Ranger can Measure More Trail in the Same Time, than Two Men with a Chain, and can Do It More Accurately

POLICE USE CORRIDOR AS REVOLVER RANGE

A long basement corridor, bounded on either side by brick walls, has been

Basement Corridor Fitted Up as a Revolver Range, at a Cost of $35, by the Police Department of Salem, Massachusetts

fitted up at small expense by the police department of Salem, Mass., as a revolver range. The total cost of making the alteration was but $35. Because of its convenient location the members of the force have found it easy to keep up their revolver practice. The target end of the corridor was covered with sheet iron over which planks were placed to prevent the bullets from rebounding. The lights were protected with sheet iron also. A plain wooden counter serves to hold the revolvers when they are not in use. When a marksman desires to inspect the target closely it can be drawn nearer on a wire which is stretched from one end of the gallery to the other. The use of this corridor suggests the possibility of similar improvements in other police stations.

HARVEST SWEET-CLOVER SEED FOR USE IN WEST

About 200 bushels of sweet-clover seed were obtained last fall by threshing great quantities of sweet clover which grew on the clay banks of the Chicago drainage canal. This seed is to be used for experimental purposes in an attempt to revitalize the soil of large western tracts used for grazing. It is now generally recognized that sweet clover has nutritive value comparable to that of clover and alfalfa and that animals develop a keen appetite for it. It will thrive in many places where neither alfalfa nor clover will grow. The hope is that by planting the sweet clover on western cattle ranges, their value as pasture land can be greatly increased. In addition to being a good forage crop this plant has blossoms which afford an abundant supply of honey for bees.

HOUSE IS BUILT OF STRAW BY WESTERN FARMER

Bales of cement-covered straw were used some time ago by a Logan County, Colorado, farmer in constructing the walls of a six-room dwelling. The house is 48 by 18 ft. in size and has the exterior appearance of a concrete structure. The bales were laid in the same way as if they were stone blocks, and then cemented over, inside and out, pebbles being added with the final exterior coat. A sufficient number of windows for adequate light and ventilation were fitted in the thick walls and a shingle roof raised. Also the inside walls and the ceilings were plastered. Although crude and somewhat reminiscent of the old sod houses of the Kansas plains, it serves its purpose and is a warm, dry shelter which, if left undisturbed, may stand for years. It cost only $270, exclusive of the labor.

¶Hereafter the Naval Radio Service will be known as the Naval Communication Service.

DRUG THIEF IS CAPTURED BY ELECTRIC TRAP

Becoming aware of the fact that some habitual drug user was systematically helping himself to morphine tablets kept on a shelf in the prescription department of his store, a pharmacist at South Pasadena, Calif., realized that he might find it difficult to explain the discrepancy in his records to the satisfaction of the authorities. Therefore, instead of concealing all the bottles of the drug so that they could not be found by outsiders, he constructed an electric trap. He did this by devising a spring switch on which he placed one vial holding a dram of morphine. The other bottles were hidden. The switch was connected with an electric buzzer and so arranged that when the bottle was lifted the circuit would be closed. The scheme worked perfectly. While attending to the wants of a customer shortly after the trap had been set, the druggist's apprentice heard the buzzer. Stepping quietly to the prescription room he found a well-dressed young man of a prominent family with the morphine bottle in his hands. Since the youth was well known and considered beyond reproach, it had been an easy matter for him to stroll back of the partition and reach the vials on the prescription shelves without exciting suspicion or attracting particular notice.

Devising a Simple Electric Trap, a Pharmacist at South Pasadena, California, Easily Caught a Drug User Who had been Systematically Stealing Morphine Tablets from the Shelves in the Prescription Department

GREAT POWER PROJECT FOR BIG HORN CANON

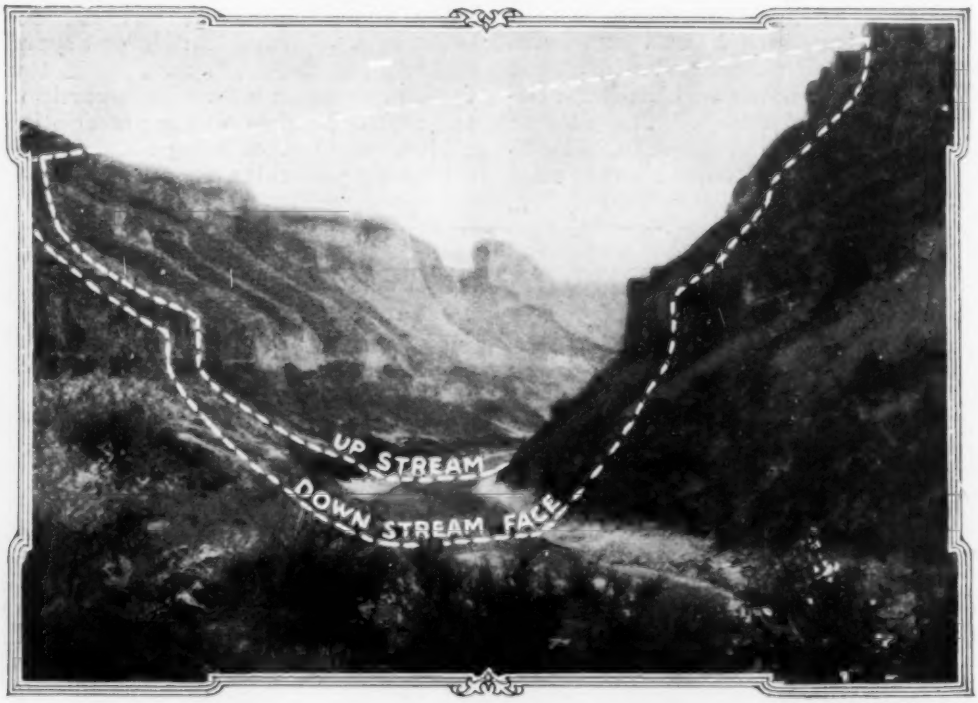
When a settler in the Big Horn Valley of Montana a few years ago dreamed of harnessing the turbulent waters of the Big Horn near the point where they break from a mighty cañon into the broad valley, so as to convert their power to the use of man, his dream was ridiculed in the locality as a fantasy and its realization counted among the impossible. Today the project of that dream is under way, and the building of a huge dam, 480 ft. high, in a narrow gorge of the Big Horn Cañon is promoted with great activity by a power and irrigation company having headquarters at Hardin, Mont., with the dreamy but practical and far-sighted settler at its head.

The enterprise includes a hydro-electric plant of large output, estimated at not less than 217,500 hp.; the irrigation of approximately 100,000 acres of fertile, high-level bench lands, now without water, and the construction of a railway, 68 miles in length, which has been located from Hardin south to the dam site and north to a point near Custer, on the Northern Pacific. The southern part of the line will be used for hauling materials for construction of the dam and power plant.

Big Horn Cañon is a natural won-

View to the Eastward from the Rim of the Big Horn Cañon, Montana, Showing Six Miles of the Apparently in the Distance. Few Men have Navigated the River.

der—a chasm 1,000 to 3,000 ft. in depth, cut in solid rock by the rushing Big Horn River. Its length, following the river, is 49.7 miles. For much of this distance the cañon walls stand vertical, and in some places they actually overhang the river. It is a true box cañon, with miles of the most beautiful cañon



PHOTOS BY A. L. BLIVEN

This Shows the Site of the Proposed Dam across the Big Horn Cañon, Looking Upstream: The Length of the Crest, as Indicated by the White Dotted Horizontal Line, will Be 1,300 Feet

Peaceful, but Really Turbulent, River and Eight Miles of the Cañon. Bull Elk Cañon is Seen to the Right but It Is Soon to be Harnessed for Man's Use

scenery in America. Surveys for the dam and railway project have been difficult, as few white men have ever made the entire trip through the cañon, and a trail had to be cut, in some places with great labor, for a distance of 22 miles, where the rapids of the Big Horn River are most dangerous.

Horseshoe Bend, One of Nature's Many Marvels in the Cañon of the Big Horn: The River Is 200 Feet Wide at This Point and the Photo was Taken from an Elevation of 3,000 Feet above the River

The site selected for the big dam is a point five-eighths of a mile from the lower end of the cañon. Here the river flows between towering cliffs of limestone rock, rising one after another to a total height of about 900 feet. The top of the dam will reach a point about halfway up the higher rows of cliffs; the length of its crest will be 1,300 ft. At low-water stage the river at the dam site is 100 ft. wide and 15 ft. deep. The dam contemplated, according to the Railway Review, will be of the circular-arched gravity type, 716-ft. radius, built of solid rubble concrete. The thickness at the bottom will be 322.8 ft. and the estimate of material required to construct it is 1,480,000 cu. yd. of concrete. In height, 480 ft., it will be the greatest in the world. Solid foundation is easily reached in the rock under the channel, however, and the engineering problems of construction are said to be simple.

The reservoir formed by the project will extend the whole length of the Big Horn Cañon above the dam and seven miles beyond. The storage capacity, to a level 435 ft. above low water, has been computed at 36,143,749,280 cu. ft. The power plant is expected to develop 217,500 hp., figured at 80 per cent efficiency at the turbines and a load factor of 50 per cent; while for eight months of the year this output probably could be doubled. The cost of the dam, including that of the railway from Hardin to the site, a distance of 37 miles, is estimated at $12,107,000. The power developed is expected to be used by railroads after electrification, as well as by neighboring towns and rural districts for electric-light and other purposes.

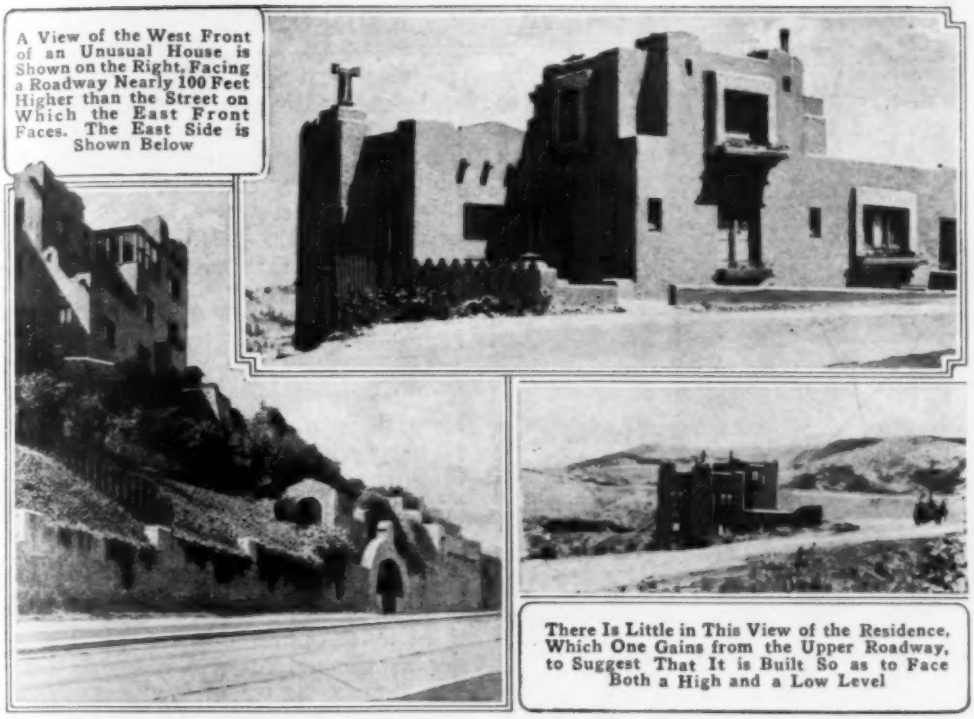
NEW JERSEY POSTMASTER'S FISHING PLATFORM

When time hangs heavily on the hands of a certain postmaster in New Jersey, whose store and post-office building stand on the high bank of a fishing stream, he manages to make the moments pass very agreeably by casting a line into the Peckham River from a little platform which he has built at the rear of the post office. From this point of vantage he is able to return immediately to his postal duties whenever a resident calls for his mail or for stamps, while when trade is slack he can catch in comfort the eels with which the river abounds. It is said locally that there will be numerous applicants for this postmaster's job whenever a vacancy occurs, but the present incumbent asserts that so long as the fishing is good he will continue to handle the mail.

New Jersey Postmaster's Private Fishing Platform in Rear of the Post Office, from Which He Catches Eels When Business is Slack

HOUSE OF PUEBLO STYLE BUILT ON STEEP SLOPE

A dwelling, which almost seems to hang on the side of a steep cliff, is an unusual architectural feature found not far from San Francisco. The west front of this peculiar house faces a street which is nearly 100 ft. higher than the street on which the east front faces. For a dwelling of the ordinary type



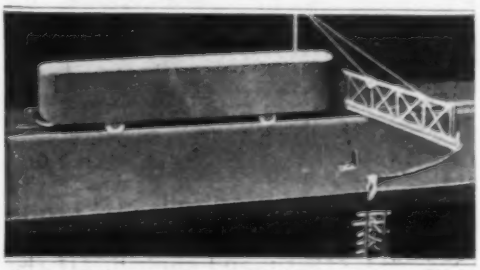
A View of the West Front of an Unusual House is Shown on the Right, Facing a Roadway Nearly 100 Feet Higher than the Street on Which the East Front Faces. The East Side is Shown Below

There Is Little in This View of the Residence, Which One Gains from the Upper Roadway, to Suggest That It is Built So as to Face Both a High and a Low Level

this almost perpendicular lot would be practically valueless, but in this case the architect has skillfully adapted the now popular Pueblo Indian style of architecture to the precipitous cliff and has produced a pleasing effect. The materials used are stucco and concrete. From the upper windows a magnificent panoramic view is obtained of the greater part of San Francisco, the bay, the cities across the bay, and the mountain range beyond. On the lower side retaining walls and shrubbery have been employed to good advantage to break the abrupt aspect of the slope. Steps mount to the entrance on this side, by easy inclines.

GATE DESIGNED TO GUARD DRAWBRIDGE APPROACHES

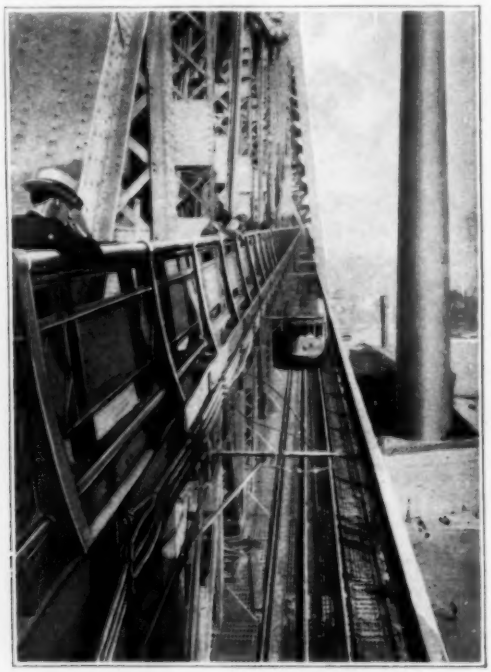
A model of a gate, designed especially to guard approaches to drawbridges when the latter are open, was exhibited in Boston recently, soon after a carload of people were plunged to their death because an open bridge had been left unguarded. The gate is strongly made and is hinged to a heavy post. At the swinging end is a cable used in locking it across the car track. The cable is fastened to a series of bolts beneath the pavement in such a way that when a car strikes the gate the impact, if violent, will break one after another of these bolts and gradually bring the car to a stop. For a swiftly moving conveyance of any kind to strike an immovable barrier would be sure to result in an accident, but with this arrangement the violence of a shock is lessened by means of the bolts.



Model of Gate to Guard the Approach to a Drawbridge: When the Gate is Closed It is Fastened to a Series of Bolts beneath the Pavement in Such a Way That a Car Striking It is Brought to a Gradual Stop

UNUSUAL VIEW OF GREAT CANTILEVER BRIDGE

The accompanying illustration gives an unusual view of a portion of the great Queensboro bridge in New York



An Unusual Photograph of the Queensboro Bridge, New York City, Which Suggests the Bigness of the Structure in a Striking Way

City, and conveys to one, better than many more conventional photographs, a sense of the magnitude of this engineering feat. It shows clearly the double-deck construction of the bridge. From the rail at the left one can look down on the trolley track and through its openwork floor are visible, far below, the ground, and the waters of the East River. Above the rail rise the great steel beams of the cantilever framework.

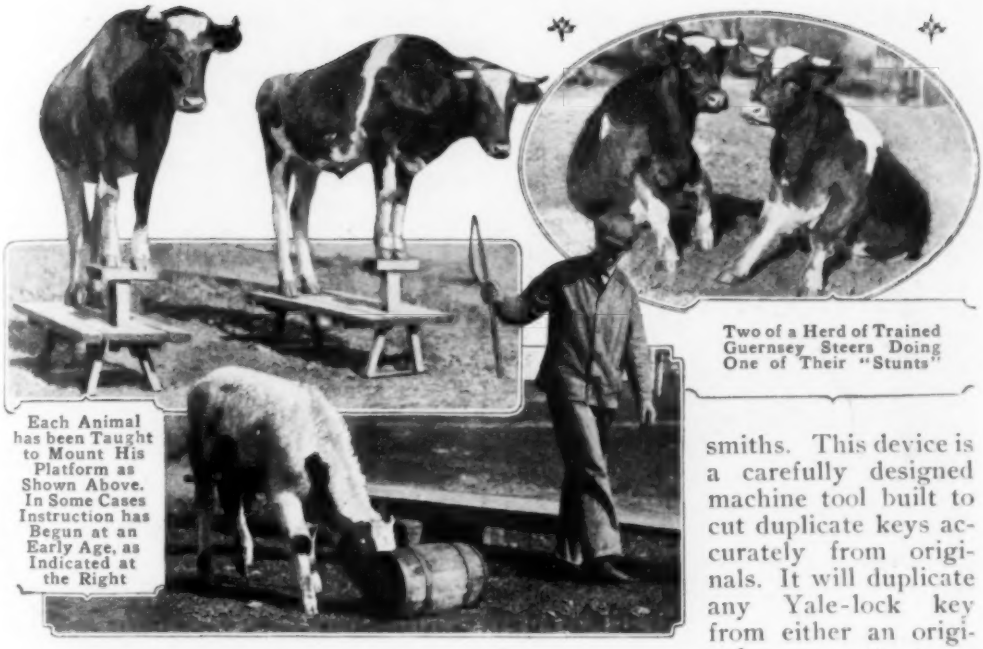
¶At the request of the Canal Zone authorities the Bureau of Fisheries, by way of experiment, has stocked Gatun Lake with several hundred black bass, rock bass, catfish, and sunfish. If the fish thrive, doubtless many more will be added.

COIN-OPERATED SODA FOUNTAIN

An automatic soda fountain has been patented by a resident of Houston, Tex., which is operated merely by dropping the proper coin into a slot. Contained in an attractive wooden cabinet are three tanks, one filled with sirup, another with carbonic-acid gas, and a third, which is surrounded with ice, is filled with water. There is also a container filled with paraffined cups. When a coin is dropped into the slot it releases three delicately balanced levers, one after the other. The first allows a cup to drop from the container into an opening, where it is within reach of the customer, and beneath two spouts. When the coin passes the next lever it releases a spring-operated apparatus that allows the proper amount of sirup to flow down into the cup. The third lever operates in the same manner as the second and allows a little less than a cupful of iced carbonated water to flow into the cup. In this way

Coin-Operated Soda Fountain Which Automatically Mixes Soda Water in a Sanitary Cup and Places It within Reach of the Customer

the drink is properly mixed in a sanitary way and supplied to the customer without human aid.



Each Animal has been Taught to Mount His Platform as Shown Above. In Some Cases Instruction has Begun at an Early Age, as Indicated at the Right

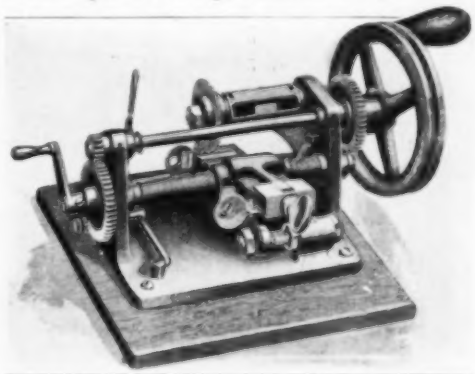
Two of a Herd of Trained Guernsey Steers Doing One of Their "Stunts"

GUERNSEY STEERS TAUGHT TO PERFORM

A man in West Brookfield, Mass., has done an unusual thing in the line of animal training by teaching a herd of Guernsey steers to do tricks, thereby showing that cattle, which commonly are thought to have a rather low grade of intelligence, can be made to act for exhibition purposes the same as horses can. Individual platforms of heavy planking have been constructed for these animals and each has learned to take his place, just as trained dogs mount their stools. Another of the acts which has been taught these animals is to roll a barrel along the ground by pushing it with the nose.

DUPLICATE KEYS QUICKLY MADE BY MACHINE

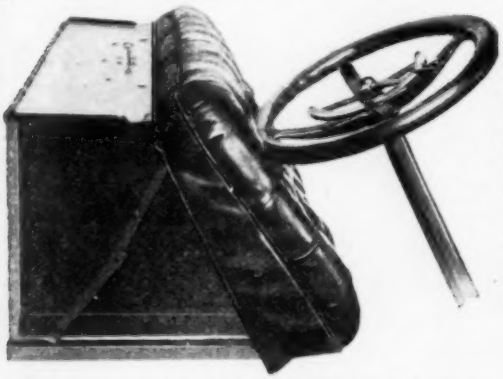
Filing duplicate keys by hand is a slow process, especially when the key is of the Yale-lock type, which must be cut with extreme accuracy. A better and quicker way is furnished by a small key machine now being used by real-estate and hotel men as well as by locksmiths. This device is a carefully designed machine tool built to cut duplicate keys accurately from originals. It will duplicate any Yale-lock key from either an original or a pattern, no matter what the make may be, and will also cut flat cabinet-lock and other keys having square-bottomed bits. In operation, the pattern or key to be duplicated is placed in one vise, the blank in another, and when firmly clamped in place, a cutter, mechanically guided, cuts a perfect duplicate in less than a minute. The machine stands 4½ in. high, is 8 in. wide, and 13 in. long, and is operated by a hand crank or power wheel, a combination of which is furnished if desired.



There Is No Waiting on the Locksmith with This Little Machine, Which Cuts a Duplicate Key from a Pattern Inside of a Minute

FOLDING TRUNK IS LOCK FOR MOTOR CAR

To safeguard a car against theft when it is left unattended, and also to provide a safe depository for robes and



When the Trunk is Raised, Tilting Forward the Seat as Shown Here, Operation of the Car is Prevented

other articles at such times, an Iowan has invented a folding trunk which, when in use, obstructs the steering wheel in such a way that a machine cannot be driven. The appliance is attached to the cushion of the chauffeur's seat and is normally folded beneath it out of sight. When raised and locked in place, it presses the cushion tightly against the wheel. The trunk is constructed of sheet metal and since its dimensions are 35 by 15 by 15 in. it provides storage space for parcels of fair size as well as wraps. It is hinged to swing forward and give ready access to the gasoline tank and tool box when these are situated beneath a seat.

RAIL BODY NOT IN FAVOR OF "DAYLIGHT SAVING"

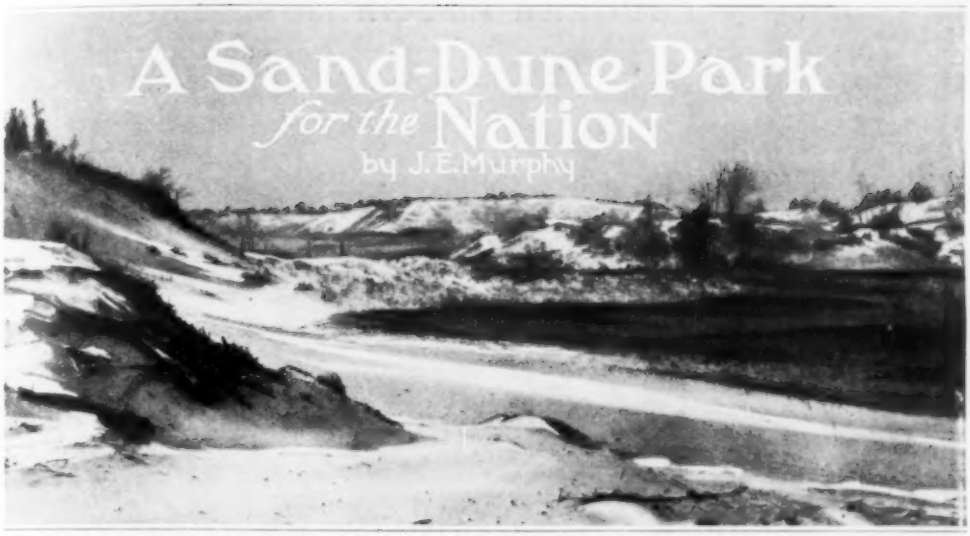
The American Railway Association's committee on standard time has recently made a report on the so-called "daylight-saving" movement, which has for its object the resetting of the clock so that the end of the working period will not approach so near the close of the daylight period. The committee declares that in the event of a nation-wide agitation for the change the railroads should not antagonize the movement. However, though these men believe that the roads would not suffer serious inconvenience or disarrangement of schedules by the change, they are of the opinion that it is not warranted from a scientific standpoint, and they say definitely that they are not in sympathy with it. The committee feels that the railways should not agree to adopt the scheme until it had previously been adopted by the principal business and municipal centers, together with the state and local authorities. It points out that unless a change such as has been proposed were made on the same date throughout the country, it would lead to confusion and difficulty.

VACUUM-CLEANING PLANT FOR HOME USE

A vacuum-cleaning outfit which is now being introduced in many homes possesses many of the advantages of larger central cleaning plants used in hotels, etc., but is of simpler construction and is easily installed. Because it draws all the dirt and dust into a receiver, which is ordinarily located in the basement, none of the dust-laden air that passes through the cleaner is discharged back into the room. The machine for home use stands about 40 in. high. Its electric motor operates a low-velocity turbine fan, which produces the vacuum. In the baseboard in each room in the house is an inlet valve connecting with tubing that leads to the machine in the basement. A system of installing the tubing has been devised which requires but little cutting of partitions, etc. Electric switches on the various floors give the operator convenient means of control. The outfit includes 25 ft. of hose and a cleaning wand with a variety of nozzles.

A Sand-Dune Park for the Nation

by J. E. Murphy



A Scene in the Dunes: What Appears to Be Snow Is Sand Which Stretches Limitlessly in Hills and Valleys

FORMING a fringe about a mile wide along the shore and following the curve of the southern end of Lake Michigan for a distance of more than 18 miles is a range of sand hills, known as the "Sand Dunes of Indiana," a name that is familiar to scientists and travelers of all parts of the world. This is the sand-dune country that is now being investigated under an act of congress with the view to making it into a national park. The statement is often made that the dunes of this district are the largest in the world. This statement is of little importance whether true or not. There may be larger dunes and there may be ranges occupying greater areas, but it is safe to say that no other sand dunes in the world are so widely known for their picturesque features or so highly prized as a field for scientific investigation. Advocates of the plan for making the district a national park argue that such action

A "Forest" Fire in the Dunes: These Fires do Not Travel Far Because the Shrubbery Is Sparse, but Sometimes They have Ruined Considerable Areas of the Dune Country

A Panorama of the Dune Country, Giving a Fair Idea of the Size and Profusion

would preserve a natural wonder that is in danger of being obliterated for industrial purposes, and that it would provide a national park where, in contrast with other national parks, there are people to enjoy it. It is less than two hours by rail from Chicago to the dune country.

The only way to appreciate the dunes properly is to tramp through them, but even from a distance they are impressive. Viewed from inland, the chain of sand peaks dominate the country to the north and give the observer much the same impression that is received on looking out of a car window and seeing for the first time the distant mountain barrier of the Rockies. From this it is not to be inferred that the dunes are mountains in any sense. They are sand hills, and the highest peak among them is barely over 200 ft. in height. Their peculiar scenic value lies in the fact that they reproduce the characteristic features of mountain scenery and give the observer the same thrill and stimulus that is experienced in viewing mountains.

Dogwood in Full Bloom, an Early Spring Attraction in the Dunes

Ages have been required for the formation of the dunes, and they are still in process of formation. Driven by the north winds that sweep unobstructed across 300 miles of water, the waves break on the south shore with greater force than at other points along the Great Lakes. Each wave, as it spends itself on the beach, leaves its tribute of sand, and this, as it dries, is blown inland by the wind, carried gradually over the barrier

of the Growth Covering It. Lake Michigan is Seen in the Background at the Right

dune that parallels the shore, and is at last deposited somewhere in the tumbled region of peaks, buttes, and cañons that extends a mile or more back from the lake and constitutes the real dune country.

The southern limit of the dune country is a marsh that serves as a definite boundary between the dunes and the so-called "back country," a district broken by occasional sand hills and marshes and having a general elevation only a few feet above lake level. The barrier dune ranges from 70 to 100 ft. in height, and except at isolated points is too steep to be climbed. At intervals there are cañons leading up through the barrier. These are known locally as "blow-outs," a term that suggests the manner in which they have been formed, being actually blown out by the winds. When the slope of a "blow-out" is climbed, it will usually be found to have a rounded crest of fine sand, and if the wind is strong there will be a mist of sand continually drifting over the crest and into the shelter of the lee side. Here one sees the process going on just as it did ages before the French explorers tramped through the dune fastnesses. The dunes that are comparatively permanent in form and location are the ones on which tree growth has taken a firm foothold. Some of these, such as Mount Tom, Mount Holden, and Mount Green, have been permanent features of the landscape for generations. Many of the dunes are continually shifting, the general movement being east and southeast. In this process whole for-

The Beautiful Blue Lupine Blossoms in the Dune Country

ests are engulfed by the sand, to reappear perhaps years later as the sand continues on its journey. No one person knows the entire dune country. There are hundreds of secluded nooks, where grow strange exotic plants, some of them practically unknown.

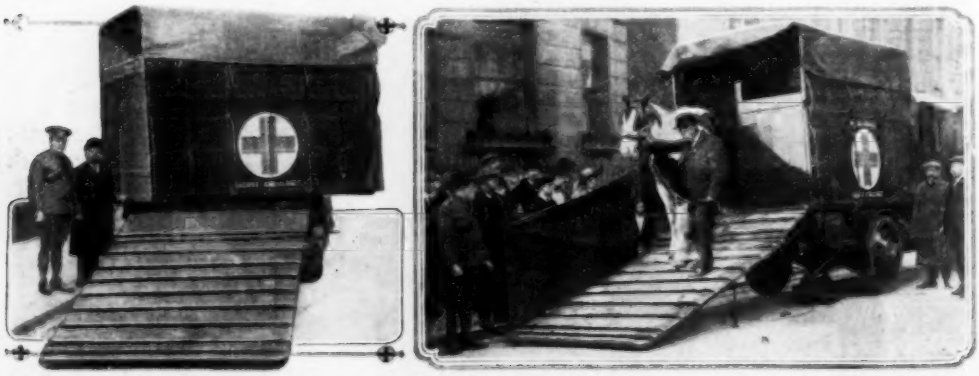
It is in the study of plant and bird life that the dunes are of the greatest scientific value. The common saying that the dune country is the meeting ground of the plant life of the entire western hemisphere is apparently correct. Cactus from the deserts of the southwest grows side by side with the bearberry from the mountain slopes of Canada. Buried deep in the forests of the oaks that are native to this climate there is occasionally found a tulip tree. At least four kinds of orchids have been found. Many plants native to southern climes may be found along the marsh and in sheltered cañons. How they came there no one knows, but their presence is accounted for in some measure by the carrying of seeds by the migratory birds. One man alone has found and identified more than 200 varieties of flowering plants.

As interesting as the plant life is that of the migratory birds. Regularly, about the middle of November, the gulls come in flocks with their young and take possession of the beach. Among them are the herring gulls, the ring-billed, and the Bonaparte's gulls. During the day they soar back over the woods and hills, but with the approach of night they return to the water. About the middle of May they suddenly disappear on their long journey to their summer home somewhere near the arctic circle. As the gulls leave, the terns come from the south, those most commonly seen being the Forster's, common, Caspian, and black terns.

A visit to the dunes gives one a feeling of being close to the life that was lived there when the Indians hunted and fought among the hills. Interesting relics are frequently found. Recently the remains of two Indian villages, as well as an Indian trail obliterated in places by the drifting sand, have been discovered. In one of the villages were found three silver crosses such as the French missionaries carried and sometimes gave to the Indian converts.

NOVEL AMBULANCE FOR WOUNDED HORSES

An improved ambulance for wounded horses has been invented by a British soldier, and a vehicle built from his plans was recently shipped to the front in France, for the use of the Blue Cross Society, which undertakes the care of wounded animals. The ambulance is fitted with a reversible body, which turns on a pivot, thus avoiding the necessity of backing the horses out, and has a folding platform at the rear.



The Body of This Blue Cross Ambulance Swings on a Pivot, So That a Horse can Both Enter and Leave by Walking Forward

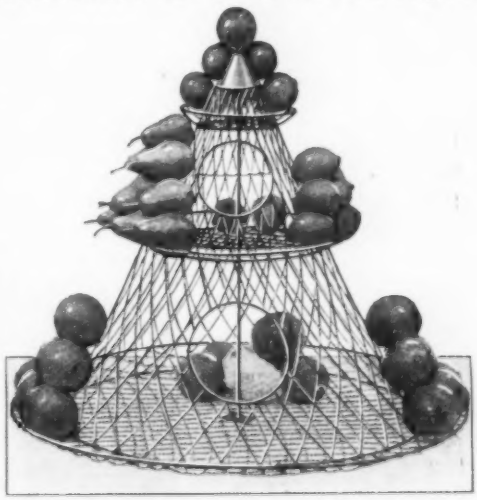
These Fire Ruins of a Popular Amusement Park Proved a Great Attraction for the People of Cincinnati, Who Paid the Usual Admission Fee to View the Wreckage of Familiar Structures, Indicated by Placards

AMUSEMENT-PARK RUINS PUT ON DISPLAY

The ruins of an amusement park in Cincinnati, which was recently the scene of a disastrous fire, were turned to good account by a manager who gauged correctly the curiosity of his public regarding the wreckage of a familiar place. The park had been a great popular resort, its buildings familiar to the entire population of the city. When the roadways and paths were partly cleared and signs placed on the ruins of the various buildings and amusement structures, indicating what was left of old landmarks or pointing out freakish effects of the fire, the public cheerfully paid the usual admission fee and swarmed to the place. Temporary fences were constructed where necessary, but the work of clearing and fencing would have been done in any case, so that the enterprising manager's receipts from the show were practically all profit.

STAND FOR DISPLAYING AND STORING FRUIT

A stand for attractively displaying fruit has been patented recently, which is so constructed that fruit can be taken from it without disturbing the display. The device consists of a conical wire frame, 24 in. high and 27 in. wide at the base. Around the bottom, middle, and top are wire shelves on which the dealer's stock can be piled so as to make what appears to be a solid cone. In one side of the stand are two large holes which give access to two compartments where surplus stock can be stored. The oranges, apples, or whatever may be kept in here, can be drawn on without disturbing the fruit on exhibition. These compartments will hold about a box and a half of oranges.



Fruit or Vegetable Rack Having Compartments in Which Surplus Stock can be Stored and Drawn On without Disturbing the Display

If preferred the stand can be hung on a hook. It can also be used for vegetables.

FIRE DAMAGES WISCONSIN UNIVERSITY HALL

A fire which recently destroyed the dome of the University of Wisconsin's Main Hall, at Madison, caused damage estimated at $25,000. Though more than 1,000 persons, chiefly students, were in the building when the fire broke out, clerks eight blocks away in the state house were the first to see the fire and turn in an alarm. The state capitol and the university hall are situated on elevations at the opposite ends of State Street. The dome finally toppled over and then the firemen were able to gain control of the flames. Crossed wires are believed to have started the fire. An American flag hoisted above the dome waved for about two hours while the structure burned, and then dropped to the earth uninjured.

Photograph Taken While Fire was Destroying the Dome of the University of Wisconsin's Main Hall. This Fire was First Discovered by Persons in the State Capitol Eight Blocks Away

REFUSE BURNER FOR ARMY CAMP

For the disposal of refuse in United States Army camps a convenient incinerator has been devised which has proved efficient. It is easily constructed by troops in camp, from cobblestones or rocks. The bottom of the incinerator is laid with medium-sized stones; the sides and one end are constructed of larger stones or pieces of rock, banked up on the outside with a sloping wall of mud which holds the stones in position and fills in the crevices. One end, in the direction of the prevailing wind, is left open for draft. The incinerator is made about 3 ft. wide, 4 ft. long, and 1 ft. high. All kinds of camp refuse may be destroyed by burning in these incinerators. Scraps

Camp Incinerator for the Disposal of Refuse, Constructed at the Training Camp of District of Columbia Troops, Fort Myer, Virginia

from the mess table, garbage including liquids, and waste paper are all burned. Discarded liquids from the mess soon evaporate when poured upon the hot stones. An occasional coat of lime improves the appearance of the incinerator, and is sanitary.

WASTE-PAPER CONTAINERS MADE OF PALM STALKS

Novel and artistic waste-paper baskets have been made from the flat stems of palm branches for use in a western park. The lower ends of the stalks are attached to a circular piece of wood, about one and one-half feet in diameter, which serves as a bottom. Around the base of the container, and also around its middle and top, are bands of wire which help to keep it in shape. These receptacles stand about three feet high and are two feet wide at the top. In the park referred to about 50 of the baskets are in use.

POWERFUL POLE JACK FOR LINEMEN'S USE

The pulling, straightening, and moving of poles has long been a difficult problem for telephone, trolley, and lighting companies. A new pole jack designed to overcome the difficulty is simple in operation and has a capacity of 15 tons. The jack is pivoted on its base, and the equipment includes a portable, nonslipping I-beam base support, a steel chain, and a steel lever bar. Only one man is necessary in the operation of straightening poles by the use of this jack. In pulling poles, contrary to the usual practice, digging around the base is eliminated. The I-beam base is placed beside the pole and the jack set upon it. The chain is slung around the pole and pulled tight through a pear-shaped link, and only a few minutes are required to lift the average pole from its place.

Telephone, Trolley, or Lighting Poles are Pulled or Straightened in a Few Minutes by the Aid of This Pole Jack

RUBBER BLANKET FOR ROAD OR CAMP SERVICE

Many uses may be found for an automobile blanket of duck, with rubber surface coating on one side, which has lately made its appearance. It comes in one size only, 45 by 72 in., but in two weights, medium and heavy. Folding into a small compact package, it is easily carried under an automobile seat or in the tool box, and in case of trouble requiring a lying position beneath the car, or when it becomes necessary to change tires in wet or muddy places, the rubber blanket is a friend indeed.

When a Rubber Automobile Blanket Comes In Handy: When You "Get Out and Get Under" to Fix Trouble beneath Your Car

NEW RAILROAD PENETRATES GREAT OREGON LUMBERING DISTRICT

NO railroad development in the Northwest in the last decade has opened up greater possibilities for the rapid development of that part of the state than the recent completion of a $13,000,000 extension into the Coos Bay country of southwestern Oregon. Here was an isolated section of Pacific coast territory, possessing a harbor that may some day rival that of San Francisco, and tapping a land rich in timber, minerals, and farm lands, some 400 miles south of Portland. Up to the time that this extension was opened, it had been completely shut off from railroad connection with the rest of the world and was reachable only by sea, or by a difficult overland route through mountainous country by stage from a point on the main line of the railroad into California.

Despite these handicaps, the towns of Marshfield and North Bend, occupying positions similar to San Francisco on San Francisco Bay, grew rapidly in population and prosperity. Thick forests of huge timber in adjacent forest lands made lumbering the chief industry of the bay, with gigantic sawmills convenient to the water. Then there was the pulp business, which in these days of European war has taken on a new importance, and one of the largest mills in the West located itself on the bay. Congress appropriated nearly $800,000 to the improvement of the bay channel. The agricultural resources of the country, comprising as it did vast acreages given over to many different crops, attracted attention.

So promising was this great territory, that the railroad company, the Southern Pacific, decided to stretch its lines to the bay and end the isolation that had existed for so many years. With a big problem before them, the railroad construction engineers decided to build a spur from the main line at Eugene, although the distance by the "line of least resistance" was at least 120 miles and the mountainous territory brought back recollections of the building of the old Central Pacific nearly half a century ago in the early days of the West. There were many rivers to be crossed, mountains to be penetrated, and uncertain, marshy ground to be filled in or trestled.

But modern railroad engineering balks at nothing, even removing mountains when necessary. Owing to the lay of the land, the surveyors and engineers decided that the easiest way was to run the spur directly west from Eugene for about 50 miles and turn southwest, gradually approaching the coast and nearly reaching it at Coos Bay. There were the Suislaw and Umpqua rivers and the bay itself to cross, but that could not be avoided. The construction of the line was started forthwith. The result of this work is now apparent and the Coos Bay extension was officially opened last August.

The final completion of the new line into Coos Bay was regarded as a momentous event and the entire section gave up three days to a railroad jubilee and celebration, in which all the people of Marshfield, North Bend, and neighboring towns took part. The chambers of commerce of San Francisco and Portland ran special excursion trains to Coos Bay so that their members could participate in the celebration and look over the new line and the country through which it ran. At different points along the coast, the new line crosses a series of lakes, which abound throughout the coast country.

The exact distance between Eugene and Marshfield by rail is 121.6 miles. To construct the new extension, it was necessary to build many tunnels and bridges, besides the roadbed. In fact, the total length of the nine tunnels is 13,925 ft., while the total steel used in the 31 bridges required was 8,134 ft. Five and one-half miles of trestles were built, while the other supplies used included 18,000 tons of track steel, 9,100 tons of bridge steel, 40,000 yd. of concrete, 50,000 bbl. of cement, and 20,000,000 ft. of Oregon fir timber.

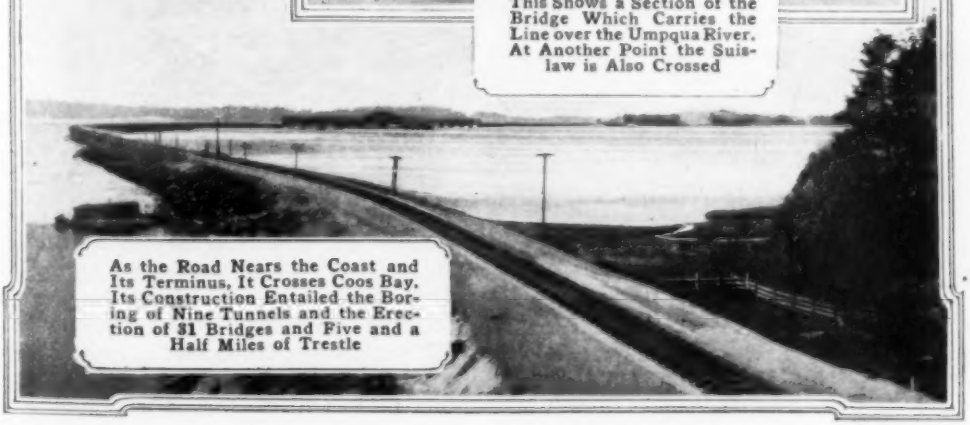
The time required for the trip between Portland and the Coos Bay

Loading a Steamer in the Harbor Which may Some Time Rival That at San Francisco. The New Line Opens a Potentially Wealthy Territory Heretofore Isolated

Reaching through Mountainous Country of Scenic Splendor, the Road Skirts a Series of Lakes Extending for Miles through the Hills

Forty Cars Loaded with Massive Logs Made Up the Train That Officially Opened the Line to Marshfield. It is Estimated That 21,000,000,000 Feet of Lumber Are Available in This Rich District

This Shows a Section of the Bridge Which Carries the Line over the Umpqua River. At Another Point the Suislaw is Also Crossed

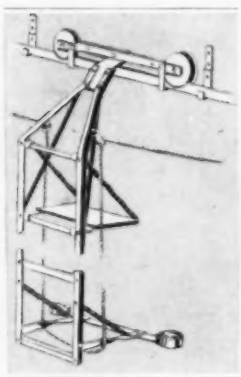


As the Road Nears the Coast and Its Terminus, It Crosses Coos Bay. Its Construction Entailed the Boring of Nine Tunnels and the Erection of 31 Bridges and Five and a Half Miles of Trestle

country was cut down perceptibly by the extension. Before the railroad came, it was necessary for the traveler from Portland to take a night train, which would reach Roseburg at 4 a. m., while the stage which left two hours later had a rough "voyage" over the mountains, reaching Scottsburg, a small town, in time to stay all night. Coos Bay was reached the following afternoon. Today the distance can be made by rail in eleven hours. Another significant feature of the extension is that of the freight movement. Heretofore it was possible to send a car from Corvallis, in the same state, to New York in the same time that it took a San Francisco or Portland shipper to get his consignments into Coos Bay. Now Coos Bay receives its freight in two days. Perhaps the most interesting fact about the new country, which is a third larger than the state of Rhode Island, is the immense timber reserves it opens up to the rest of the country. There are approximately 21,000,000,000 feet standing, the larger part of it privately owned. It is chiefly fir and spruce, tremendous in height and girth, and characteristic of the wonderful timber resources so abundant in that section of the country.

TRAVELING STEEL LADDER IS MADE FOR SILOS

As a safeguard against the accidents that occasionally occur when ordinary ladders are used in scaling cylindrical silos, a western firm is bringing out a traveling ladder designed to be permanently attached to such structures. It is constructed of steel and hung in the same manner as the average barn door, operating along a track at the top and kept in proper alinement by rollers at the bottom. A rope passed about the silo and through pulleys attached to the ladder, enables the device to be moved to right or left without making it necessary for the user to descend to the ground. Thus painting may be done, or the hoops of a silo tightened, without the worker being in constant danger of falling and seriously injuring himself.



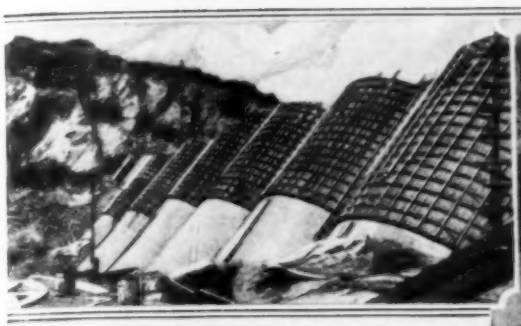
¶A maker of articles for little folks is putting out a series of pictures on child subjects, strongly framed and covered with unbreakable "celluloid glass."

BLISTER RUST RAVAGING WHITE-PINE FORESTS

The white-pine blister rust, a disease for which there is no known cure, threatens to ravage white-pine and other five-leaved pine forests valued at $260,000,000. The disease has already secured foothold in Canada, New England, and other eastern states, and has appeared as far west as Wisconsin and Minnesota. New York and Wisconsin have established a rigid quarantine to check the spread of the disease, and the agricultural boards of other states are coöperating with various organizations to prevent the transportation of infected pines or disease-bearing bushes. The spores of the blister rust are blown from infected trees to currant and gooseberry bushes, where they germinate on the leaves and then are carried to other pines, often a considerable distance away.

GREAT MULTIPLE-ARCH DAM DESTROYS WESTERN FALLS

High up in the Sierra Nevada Mountains of central California an electric-power company has erected a dam which is of twofold interest. It is one of the largest dams of the multiple-arch type ever built, and its erection destroys Silver Lake Falls, one of the most beautiful cataracts in the state and one which many citizens en-



View of the Dam before Its Completion: The Structure Is 680 Feet Long and 70 Feet High, and the Power Plant with Which It is Connected will Eventually Develop 16,000 Horsepower

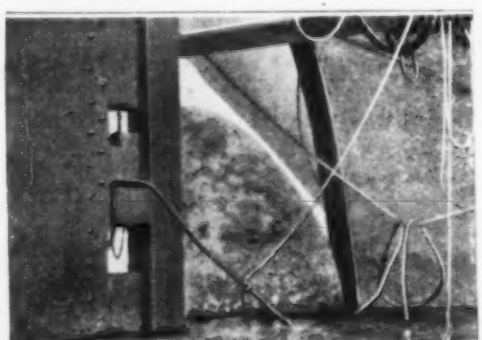
deavored, without success, to preserve. The falls made a series of plunges totaling more than 2,000 ft., and, as the accompanying illustration shows, at more than one point it spread out over great shoulders of rock in a truly wonderful manner.

The dam which diverts the waters that until a short time ago produced the falls, is 680 ft. long and 70 ft. high, and is composed of 17 reinforced-concrete arches, having a radius of 23 ft. on their upstream face. The first of two units of the power plant has been completed, and its turbines are generating about 5,000 hp. When the second unit is finished, which will be some time next summer, the two will generate 16,000 hp. This dam alone cost $250,000. One of many great obstacles which have confronted the engineers in carrying out this project has been its distance from the railway. The nearest rail point is 56 miles away. As a first step, the company had to spend $40,000 in building roads. Over these highways the great bulk of the material was hauled, including 75 carloads of cement.

Silver Lake Falls, Which has been Destroyed by the Completion of a Huge Multiple-Arch Dam That Diverts the Water to Turbines

PROPELLER OF INTERNED SHIP IS MOSS-COVERED

Interned in Manila Bay are about 16 German merchantmen, aggregating 36,000 tons, which cannot venture forth on account of the war. As they lie there in idleness their sides and also propellers are collecting barnacles and moss, as shown in the accompanying illustration, which gives a close view of the stern of one of the ships. The vessel evidently is carrying little cargo, for one of the thickly coated propeller blades projects a considerable distance above the water.



Close View of Stern of German Merchantman Interned in Manila Bay, Showing the Growth Which has Collected on the Blade of the Idle Propeller

AMERICA'S ATTRACTIVE COUNTRY CLUBHOUSES

Imposing Home of Blue Hills Golf Club at Kansas City, a Fashionable Playground within Corporate Limits. The Immense Building Is of Native Stone and Stucco. An Attractive Feature of It Is the Long, Glazed-In Dancing Pavilion Pictured at the Left. The Twelfth Hole, 263 Yards, is Proclaimed the Hardest of the 18. Tall Grass Bordering a Narrow Fairway, a Hollow with a Meandering Ditch, and Rocky Embankment, Conspire against the Golfer

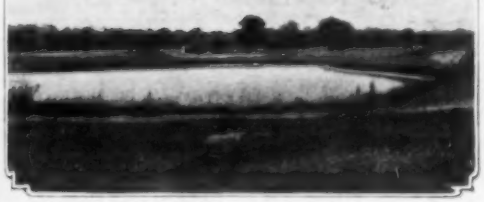
Above and Below are Given Two Picturesque Glimpses of the Peoria, Illinois, Country Club's Splendid Seat. Situated on the Crest of a High Bluff Overlooking the Illinois River, and Surrounded by Magnificent Grounds and Beautiful Trees, the Building Has an Exceptional Setting. More Famed Are the Quarters and Scenery than Is the Nine-Hole Golf Course, Which Has No Particularly Distinguishing Feature

Before His Untimely Demise, George Fitch Frequently Played on the Nine-Hole Course of the Kickapoo Golf Club at Peoria, Illinois. It Is in Honor of Him That This Broad, Deep Ravine, before the Sixth Hole, has been Named Fitch Hollow. The Distance from Tee to Green Is 120 Yards

AND SOME OF ITS BEST-KNOWN GOLF COURSES

In Addition to Its Elegant Quarters, the Edgewater Golf Club at Chicago Boasts Interesting, Sporty Links. From the Clubhouse's Broad Verandas the Entire Course Is Visible. Probably the Most Difficult Hole Is the Seventh, 370 Yards. At 260 Yards from the Tee the Fairway is Crossed by a Formidable Bunker Which Slopes into a Small Lake from Which the Picture at the Right was Taken. Trees Guard the Greea on Both Sides, While Pits Catch Overdriven Balls

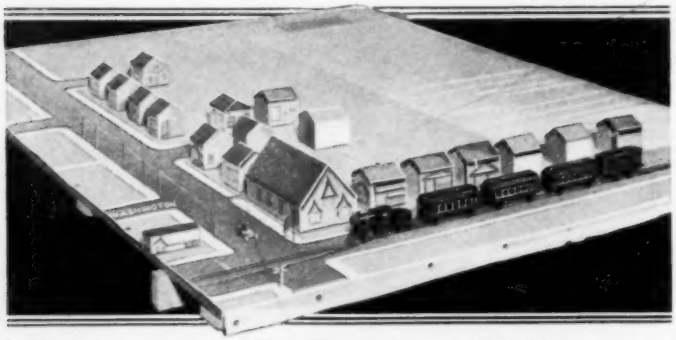
A Large and Very Imposing Colonial Home Situated on a Knoll Overlooking the Whole Course, Harbors the Members of the Exmoor Country Club at Chicago. One of the Aggravating Holes Is the Thirteenth, Which Is Guarded Solely by Water, as Pictured Below. The Lake Is an Artificial One, 40 by 100 Yards in Dimensions. The Distance of the Hole Is 150 Yards. Par for It Is Three, but It has been Played in Two



Few Clubs are Better Known than the South Shore Country Club at Chicago. Its Pretentious, Richly Outfitted, Five-Story Clubhouse beside Lake Michigan Is One of the Finest in America. In Playing the Seventh Hole on the Nine-Hole Course the Artificial Lake Shown Above Offers a Mental Hazard. The Distance of the Hole Is 167 Yards, with Three as Par. It has been Made in Two Strokes a Number of Times. Additional Difficulties are Presented by Trees Which are Encountered by Hooked or Overdriven Balls

TOYS ARE USED IN COURT TO DESCRIBE ACCIDENT

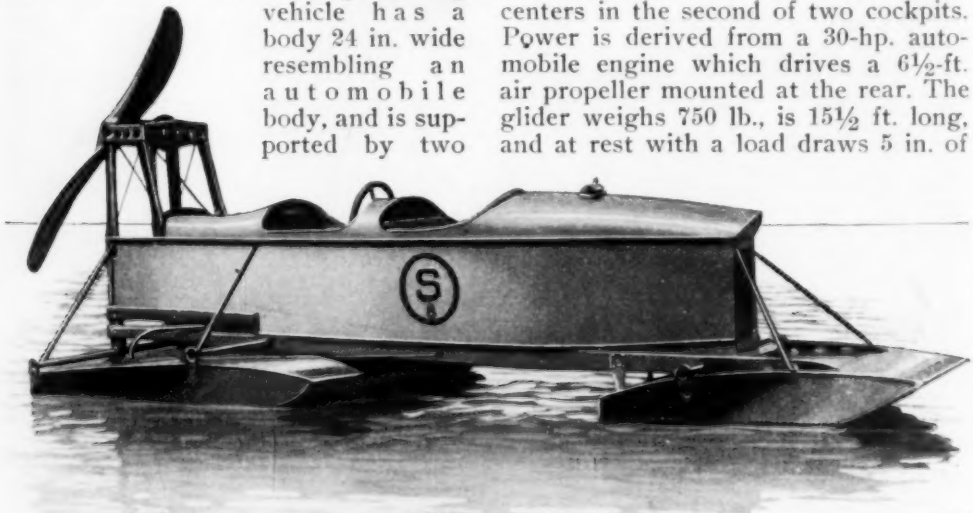
During the trial of a damage suit against a railroad company and a jitney-bus owner at Long Beach, Calif., a toy train and motor car were used on a map, showing the intersection of Tenth and California streets, to assist witnesses and the attorneys in making their statements clear to the court. A jitney had collided with a passenger train at the crossing, resulting in the death of four persons. The model was placed on a table before the jury box, and the miniature train and car moved by different witnesses to show graphically the relative positions of the originals when they first saw them, as well as immediately preceding, and at the time of, the tragedy. The map was drawn to scale and the buildings lining the streets cut from blocks of wood and colored with chalk. The model proved to be very helpful.



In Testifying to the Court, Each Witness Illustrated His Statements with the Aid of the Street Map, Toy Train, and Car

SPEEDY WATER SLED RIDES ON FLOATS

What has been designated as a hydro-glider is a new water craft, driven by an air propeller, which has been built by two young men in Bellevue, Ky., and tried out by them on the Ohio River. The strange-looking vehicle has a body 24 in. wide resembling an automobile body, and is supported by two floats. One of these is at the rear and is 6 ft. square, and the other is at the front and is 4 ft. 9 in. long by 4 ft. 4 in. wide. These floats are made of cedar and oak and have a sharp forward edge which is tilted slightly above the water. The craft is equipped with a shallow-draft rudder and an automobile steering wheel. All the control centers in the second of two cockpits. Power is derived from a 30-hp. automobile engine which drives a 6½-ft. air propeller mounted at the rear. The glider weighs 750 lb., is 15½ ft. long, and at rest with a load draws 5 in. of

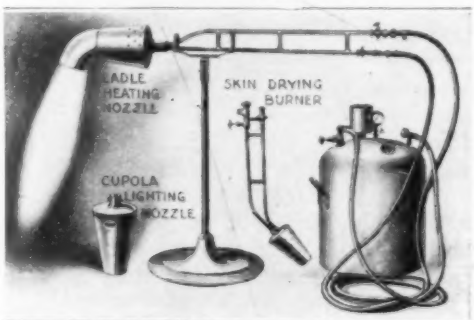


A Water Craft Which Rides on Floats: It is Driven by a 30-Horsepower Automobile Engine and When Traveling Draws About Two Inches of Water

water, while its draft when under way is but 2 in. The builders propose to substitute a more powerful but lighter motor of the rotary type which their tests lead them to believe will drive the glider at more than 30 miles an hour. The craft is so constructed that ice runners can be substituted for the floats.

FOUNDRY BURNER HAS SPECIAL FEATURES

A portable burner for lighting cupolas in foundries, heating ladles, etc., is now being manufactured, in which are combined a number of desirable features. The burner consumes crude oil, kerosene, or distillate which is discharged in a fine spray produced by compressed air that is pumped into the tank. Three nozzles are included with the outfit, one for skin-drying molds, one for heating ladles, and the third for lighting cupolas. A stand



A Burner for Foundries Which Consumes Crude Oil or Kerosene and is Equipped with Three Interchangeable Nozzles

is provided to support the burner when heating a ladle. The tank is equipped with a safety valve, which automatically shuts off the oil supply in case the hose is accidentally cut. The outfit is comparatively light and can be moved about easily.

CAMERA FOR AEROPLANES OF MILITARY TYPE

A camera recently introduced to the attention of military airmen takes a 4 by 6-in. photograph every four yards during the flight of an aeroplane, and can keep up that rate for a considerable length of time, according to the inventor. It is designed for use with army machines. An airman flying over the

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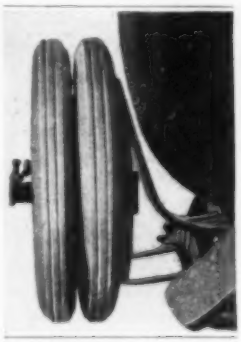
Camera Designed for Use with Aeroplanes, Taking Photographs Every Few Yards during Flight

enemy's lines could thus obtain photographs showing details of the scenes below that would not be visible to the eye of the keenest observer.

SIMPLE TIRE CARRIER FOR MOTOR CARS

Spare tires carried on the side of a motor car are generally regarded as unsightly and they are often in the way. Hence the growing tendency in favor of rear-end tire carriers. A new carrier of this type, which has lately made its appearance in the West, holds one or two tires in such a manner that there is nothing in contact with them to chafe the casing, no straps, chains, or pans being used. A simple system of toggles or arms is used to hold the tires firmly in place, and a padlock protects tires and rims from theft. To remove a tire it is necessary only to unlock the padlock and push in the toggles, no tools being required.



Collection of Guns and Rifles Confiscated by Massachusetts Game Wardens under New Law Prohibiting Aliens from Having Firearms in Their Possession. They were Recently Taken Out into the Harbor at Boston and Dumped

MANY WEAPONS CONFISCATED IN MASSACHUSETTS

About a year ago the state of Massachusetts enacted a law prohibiting aliens from using or having in their possession firearms of any character while within the confines of the commonwealth. The purpose of this legislation is to restrict hunting by unnaturalized foreigners and prevent the undue destruction of game and other birds, which are frequently killed in large numbers by such persons. As a result of the ruling a considerable number of rifles and shotguns of different kinds have been confiscated by the authorities. The law carries with it a fine and prison sentence for those found guilty of violating it. For this reason many aliens who have hunted in spite of the ruling have thrown away their guns and taken to their heels upon the approach of game wardens. These weapons, some of them cheap, but a few excellent pieces, have fallen into the hands of the authorities. Not long ago a collection of some 50 guns and rifles which had been gathered in a very short period, were thrown into the harbor at Boston. Among them was a 20-gauge shotgun fashioned to resemble a walking stick.

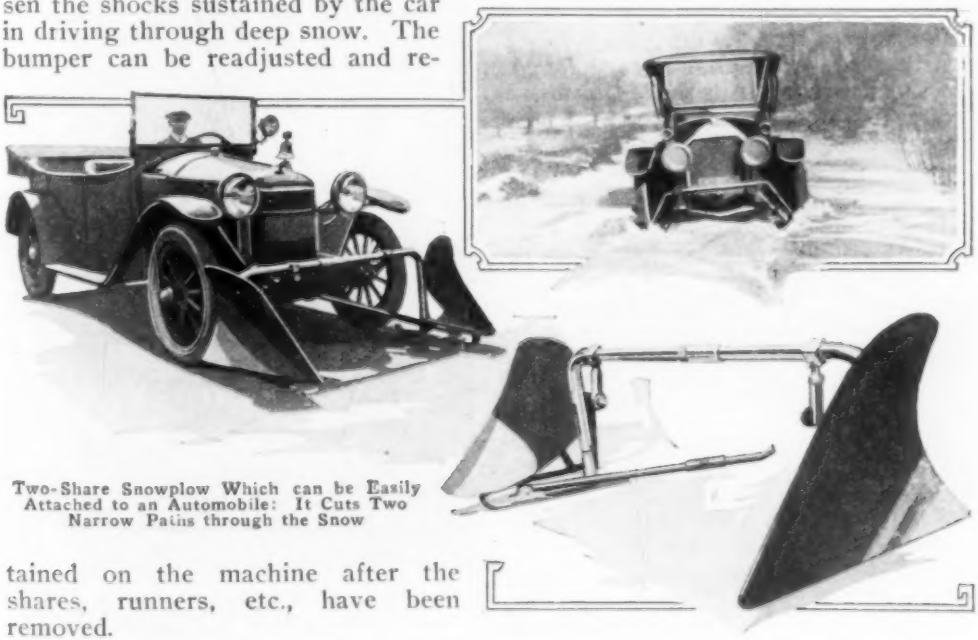
POWERFUL NEW LIGHT ON ALASKA COAST

The Cape St. Elias light station, which was recently placed in commission, is an important aid to shipping on the coast of Alaska. For vessels bound for Cook Inlet or Prince William Sound from the Pacific coast of the United States or from southeastern Alaska, it serves as the landfall light. The lamp is of 300,000-cp. capacity, and because of its elevation can be seen more than 15 miles. The fog signal consists of a 6-in. automatic compressed-air siren, in duplicate, each

with a trumpet with a two-way mouth. The light gives a double flash every 20 seconds and the horn a double blast of four seconds each, every minute. The station is located on the south end of Kayak Island, 45 ft. above the level of the sea. Living accommodations for three keepers are provided. An automatic gas light was maintained on an off-lying rock during the construction of the lighthouse.

SNOWPLOW ATTACHES TO FRONT OF MOTOR CAR

An automobile snowplow, which is capable of rendering good service on snowbound roads, has been invented and tried out with success. Two steel shares, resembling the share of an ordinary walking plow, are attached to the front of an automobile by means of a special fender. The shares are so placed, directly in front of the two front wheels, that each plows a clean narrow track for the wheels to follow it. The snow is thrown to the right and left of the respective wheels. Under each share is a runner which helps it to ride over any unevenness in the ground. Springs are provided to lessen the shocks sustained by the car in driving through deep snow. The bumper can be readjusted and retained on the machine after the shares, runners, etc., have been removed.



Two-Share Snowplow Which can be Easily Attached to an Automobile: It Cuts Two Narrow Paths through the Snow

PINS TO FASTEN COVERS ON COCKS OF ALFALFA

What is called alfalfa pins are made by a manufacturer of wire goods in the East, to use in fastening canvas covers over the tops of cocks of alfalfa left in the field to cure. These pins are made of heavy galvanized wire, are 15 in. long, and each has a ¾-in. eye in one end, so that it can be inserted and withdrawn easily. Four are used for each cover.

Each pin is inserted into the cock for about two-thirds of its length, pointing down at an angle. Then it is brought to a horizontal position and pushed in the remaining distance. This serves to draw the cover down tight, and it is held so securely that the wind cannot remove it. Rings are provided by which each set of four pins can be kept together when not in use.

STEAM HEAT CONTROLLED BY RADIATOR COVERS

An automatic apparatus of novel character, for maintaining room temperatures at a uniform degree, has been

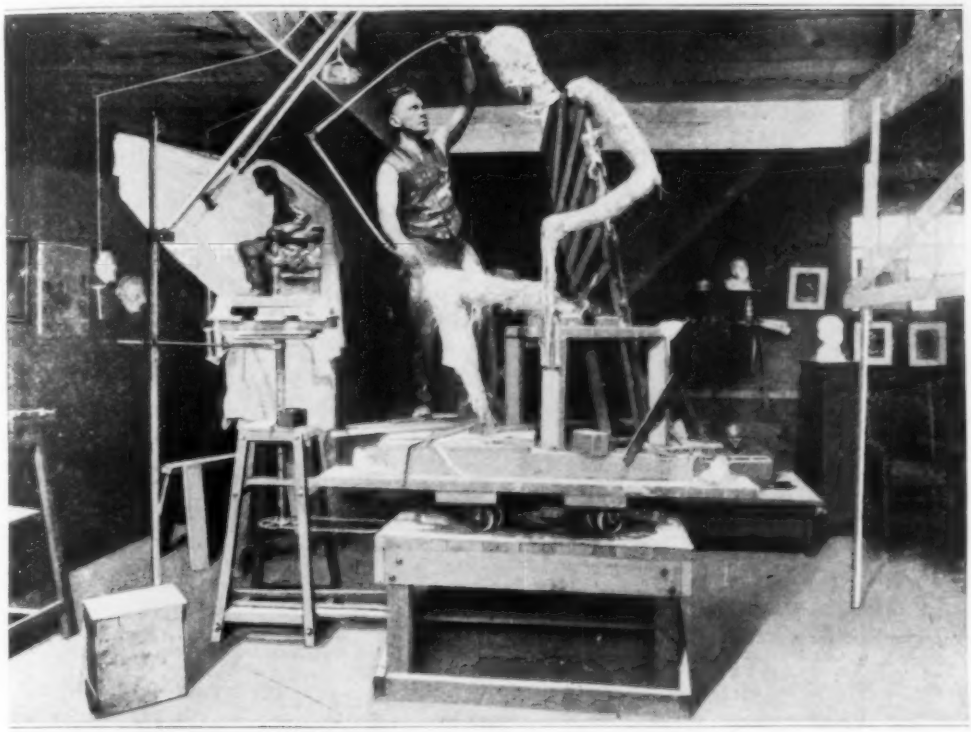
Under This Artistic Covering for a Radiator There Is a Regulator Which Automatically Opens and Closes "Louvres" to Maintain Uniform Temperature in the Room

invented and placed on the market in Knoxville, Tenn. Outwardly this is a thoroughly insulated covering, or jacket, which fits over the steam or hot-water radiator, and is made of furniture steel, having a properly designed grill in front. Back of this are placed "louvres," or shutters, which are opened or closed automatically by the concealed regulator, as it responds instantly to the slightest change in temperature of the air circulating over and around it. The regulator is so arranged that it is exposed to the room air. When it opens or closes the louvres, the circulation of air over the radiator is thereby increased or decreased, so that the temperature of the room is held practically constant. Any temperature between 60° and 80° F. can be obtained by setting a regulator dial at the proper point. The dial is found just under the top of the jacket. The apparatus is especially fitted for the maintenance of equable temperatures in the rooms of hotels, schools, hospitals, clubs, and other large buildings, as well as residences.

INDIVIDUAL DRINKING CUPS FOR CITY HORSES

An improved drinking fountain for horses has made its appearance in the large cities, where the ugly and insanitary horse trough is a thing of the past. The new fountain has individual drinking cups or bowls, in which the water comes surging up through the bottom of each bowl and keeps it overflowed all the while, so that the muzzle of the horse in drinking does not touch even the brim. There is no return of waste water through the bowl, nor is any water permitted to stand in the bowl or in the large basin of the fountain, for all waste is carried at once through openings in the bottom of the basin to the sewer. Thus the horse is reasonably protected against infection from this source.

Improved Drinking Fountains for the Horse, with Individual Drinking Cups, are Now Installed in City Streets



MODELING A HEROIC STATUE OF LINCOLN

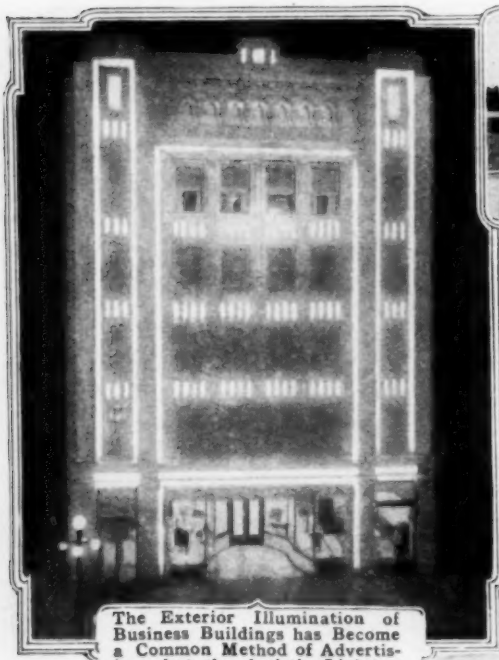
WHILE the model of a heroic statue is in the making there is little in its grotesque appearance to suggest the beautiful finished product. This is well illustrated in the accompanying photograph of a Topeka, Kan., studio, where the artist is shown constructing a model of a statue of Abraham Lincoln, that is to be erected in the state house grounds. This is a phase of the work which is primarily dependent on mathematics rather than artistic skill, for the sculptor is simply reproducing on a large scale the small model shown at the left of the picture. Eventually the framework which appears so ungainly, but which has been built with a view to exact proportion, will be covered with clay and will be transformed into an enlarged reproduction of the small clay model. School children and public-spirited citizens have shared in bearing the cost of this monument.

RUSTIC OVEN FOR USE BY BEACH PARTIES

A large stone oven, roughly finished, but symmetrical and pleasing in design, has been built on the ocean beach by the city of Santa Monica, Calif., for the use of picnickers. Its cost was not great because rocks were used which had been blasted out while a road was being constructed near by. On the top of the oven are iron gratings which can be used for broiling or roasting, or for warming coffee. The rocks, together with the bricks which form the bottom of the fire pot, are cemented together. The broad, tapering chimney was built high enough to carry off the smoke so it would not annoy persons using the oven.

Substantial Stone and Brick Oven Erected on the Beach by the City of Santa Monica, California, for the Use of Picnickers in Warming Coffee or Cooking Meats

WIDE-AWAKE OUTDOOR ADVERTISING SCHEMES



The Exterior Illumination of Business Buildings has Become a Common Method of Advertising, but the Artistic Lighting of Them Is Somewhat Rare. At Billings, Montana, a Power Company has Obtained Splendid Effects by Arranging Incandescent Lamps in Channels, Cut Vertically and Horizontally in the White Facade of Its Structure, and Covered with Opalescent Glass

This Is Not a Six-Room Modern Cottage of Spanish-Colonial Architecture Surrounded by Landscaped Grounds, but an Outdoor "Stage Setting" Which Advertises a Certain Real-Estate Company. The House and Trees Are Signboards

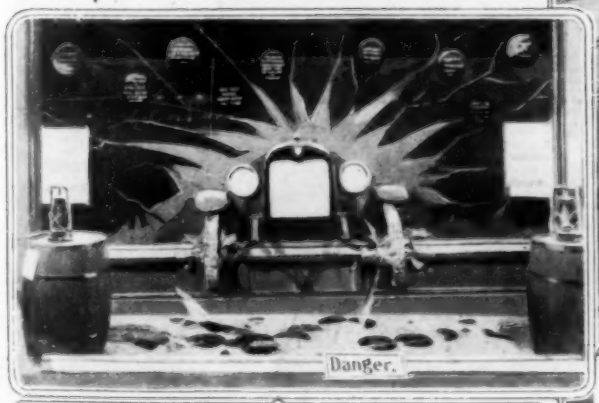
Billboards are Excluded in the "City Beautiful" Plans of Most Municipalities, but Los Angeles Attests That This Ornamental One, in the Heart of an Important District, Is Preferable to the Unsightly Excavation Which It Hides. Arrangements were Made for Erecting a Building on the Site, but Only a Hole was Dug

Some One Once Said: "It Pays to Advertise." This Jam would Indicate as Much. Probably Not All of the Men and Women in the Crowd Immediately Dashed into the Waco, Texas, Department Store to Make Purchases after Witnessing the Style Show Staged on the Canopy in Front of the Building, but Few, if Any, of Them Failed to Learn What the Company was Offering for Sale

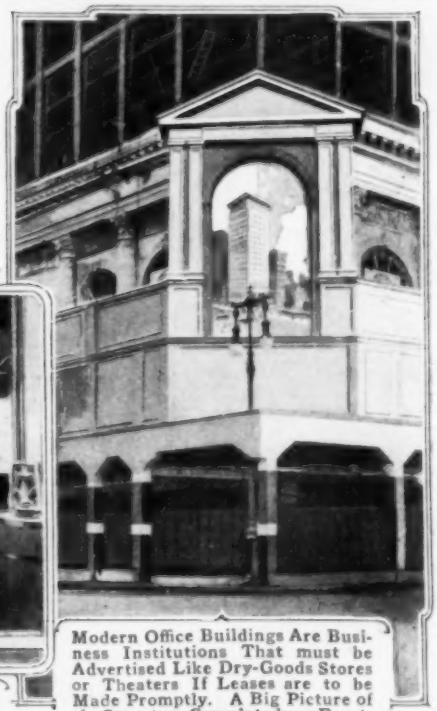
THAT HAVE PROVED STRONG DOLLAR MAGNETS

The Telephone Is the One "Caller" That Receives Immediate Attention, That Obtains an Interview Ahead of Those Waiting Their Turn on the Other Side of the Door Marked "Private." Anyway, This Is the Thought Presented by a Telephone Float Used Not Long Ago in an Industrial Parade at Indianapolis

Folks Chronically in a Hurry Invariably Jump at Conclusions: That Is Why One Window-Shade Dealer has Derived Much Publicity by Being a Bit Facetious. A Roller Curtain, at the Right, is Drawn across the Windshield of His Car When It is Left at a Curb



Every Street Crowd Is Brim Full of Curiosity; Therefore This $25 Window Display Attracted 50,000 Persons and Sold Six Machines for a Philadelphia Motor-Car Agent. The Radiator, Tire Sections, and Lamps are Attached to the Outside of the Window, Which Appears Shattered Because So Painted. Broken Glass Litters the Sidewalk, While Red Lamps and Danger Signs Complete the Illusion



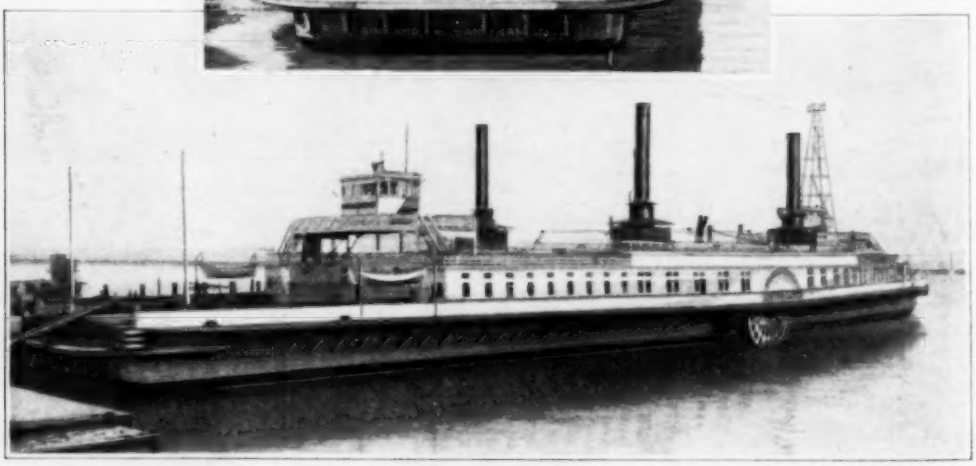
Modern Office Buildings Are Business Institutions That must be Advertised Like Dry-Goods Stores or Theaters If Leases are to be Made Promptly. A Big Picture of the Structure Completed was Erected before This New York Building to Advertise It during Construction. At Chicago the Idea was Carried Further, Spaces being Provided for Future Tenants' Announcements

SHOEMAKER EXPERT ENABLES AFFLICTED TO WALK

Work of truly remarkable character is being done by a shoemaker—an orthopedic expert—of New York, in the fitting of shoes to those who find difficulty in walking in ordinary footgear. For ordinary cases a series of "inner foot molds" has been prepared, in sizes to fit various feet. These resemble ordinary insoles in general appearance, but the upper surfaces are uneven, having indentations and projections that insure a contact anatomically perfect for the soles of the feet. The edges are curved slightly upward. When molds are found in which the feet rest in comfort, supporting the weight of the body in perfect balance, these molds are worn inside shoes of a suitable size. The feet then rest on a sort of cup-shaped cushion and are kept from pressing unevenly against hard, flat surfaces such as are found in ordinary shoes. In footwear thus fitted, the weight of the body is equally distributed to the parts of the feet best able to sustain it, all of the foot surface being used. A normal condition for the feet is thus made possible, and the bones, muscles, and ligaments are permitted to move naturally. Some extraordinary cases have also been successfully fitted with footwear after walking had become a burden or a seeming impossibility.

GREAT RAILROAD FERRY ON PACIFIC COAST

A vessel which is claimed to be the largest ferryboat in the world carries trains across Carquinez Straits, between Port Costa and Benicia, Calif., a distance of one mile. It is the property of the Southern Pacific Railway Company and is 433 ft. in length over all, 116 ft. beam over guards, 66 ft. molded beam, and measures 3,800 tons. The deck has four train tracks with a capacity of 36 freight cars or 24 passenger cars, and two locomotives. Two sets of oil-burning en-

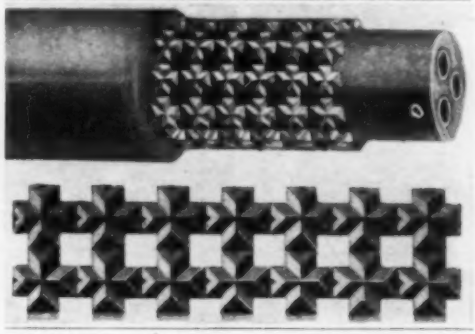


Southern Pacific Ferryboat, the "Contra Costa," Which Carries Two Freight or Passenger Trains with Ease

gines, each of 2,500 hp., turn a paddle wheel on each side, by which the boat can be swung around in its own length. Hull and superstructure are of wood and contain 2,000,000 ft. of lumber. There are single timbers measuring 26 in. square and 66 ft. long, and others 18 in. square and 116 ft. long, used in the hull.

FIREPROOF LATH MADE OF WIRE CLOTH AND CLAY

An improved building material for fireproof construction of various kinds consists of a composite metal lath made of annealed wire cloth on which is pressed a coating of brick clay. This provides a plaster base which is strong and yet flexible. For example, the lath can be wound around a pipe or cable, that requires a fireproof coating, and covered with cement. This lath may also be used to advantage on concrete structures which are to be covered with plaster or tile. In such cases it is placed as a lining on the forms and



COURTESY OF ENGINEERING NEWS

A Flexible Metal Lath Designed for Fireproof Construction That is Made of Wire Cloth on Which is Pressed a Coating of Brick Clay

when they are removed the concrete walls will be covered with the lath, which give them a surface well suited to bonding so that they can be covered with the proper finishing materials.

OLDEST AUTO EXCHANGED FOR LATEST MODEL

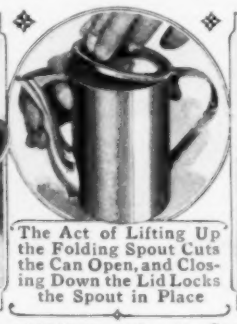
A strange-looking motor car was recently brought to light when an automobile - manufacturing company in Indiana offered to exchange one of its 12-cylinder cars, 1917 model, for the oldest automobile of the same make that could be found. The eager search which followed resulted in the discovery of the vehicle shown in the accompanying illustration. It was owned by a resident of Jeffersonville, Ind., and was purchased in 1897 for $1,250. The car, which after 20 years appears so antiquated, is equipped with a two-cylinder engine, is guided by a lever, and cranks from the side. Only a few minor repairs were needed to put it in good condition. It can attain a speed of 18 miles an hour. The vehicle was secured to be exhibited at a good-roads celebration.

Automobile Made in 1897 Which was Recently Exchanged on Even Terms for a 1917 Car of the Same Make: The Old Vehicle was Secured by the Makers for Exhibition Purposes

CONVENIENT SERVER FOR CANS OF LIQUID

For serving liquids packed in cans, especially milk, a new container has appeared, which supersedes the old method of opening such a package with a hammer and nail, or a can opener, making two unsightly holes in the lid, and then bringing the can to the table, where the holes promptly gum up and become dangerously insanitary. The new can server comes in the shape of a sightly and healthful creamer, made of steel, copperplated, then heavily nickelplated. The can of liquid is placed inside this server, which is made to fit it. There is a folding spout, with a cutting edge at the bottom, which opens the can as the spout is lifted quickly to place, to be locked by the closing of the cover. Then the contents of the can may be poured as with an ordinary creamer.

This Shows How a Can of Milk is Inserted in a New Container and Server for Canned Liquids—a Portion of the Paper Label being First Removed as Seen in the Picture



The Act of Lifting Up the Folding Spout Cuts the Can Open, and Closing Down the Lid Locks the Spout in Place

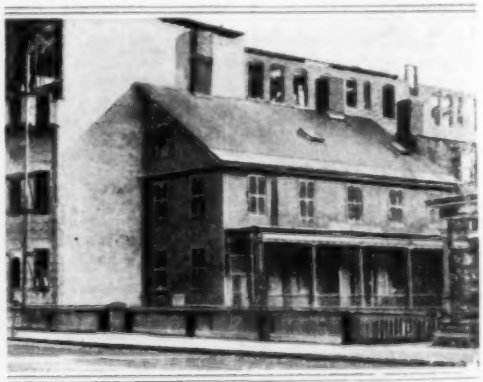
Serving Canned Milk from the Container, Which Is Both Sightly and Sanitary and can be Used in This Manner, Just Like an Ordinary Pitcher, with the Can Inside

SPRINKLER HEADS NEED TO BE INSPECTED

Where sprinkler systems are relied upon for fire protection it is necessary that they be inspected carefully from time to time, to see that the sprinkler heads are in working condition, ready to fuse when the temperature rises to the danger point and to let the water emerge from the pipes in case of fire. There are regular systems of inspection for this purpose and it is by no means uncommon for the inspectors to discover sprinkler heads so badly corroded, or otherwise injured, that their efficiency is destroyed. This is particularly the case in industrial establishments where the materials used or the methods of manufacture tend to damage the sprinkler heads. Many examples of useless and depreciated heads are sent by inspectors to the Underwriters' Laboratories in Chicago. Most of these have been damaged by industrial processes, as where they are corroded by various acids used in the arts. But in many cases the neglect of ordinary businesslike precaution is responsible for their condition; as, for instance, in a factory where sprinkler heads were found so completely gummed up by the varnish frequently sprayed beneath them in the course of the day's work that they would have totally failed to perform their duty in case of fire.

OLD AND NEW CONTRASTED WHEN HOUSE IS HALVED

In Cambridge, Mass., not far from Harvard University, is an old dwelling that has been cut in two lengthwise, and presents a most unusual appearance. It is an odd example of the re-



Old Frame Dwelling in Cambridge, Massachusetts, Which has been Cut in Two Lengthwise to Make Room for a Modern Brick Structure

Eggs to be Candled are Placed in the Tester as Shown Below: When the Swinging Cover is Closed Down, any Defects are Readily Detected

Cabinet of Tester is Designed to Hold a Standard Trayful, Which is Lifted Direct from Shipping Case, as Shown at Right

Candling Eggs with a New and Convenient Tester: The Eggs are Seen with Electric Lights Shining through Them

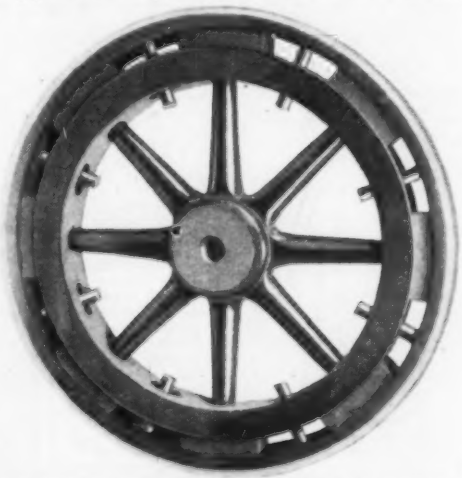
sults which sometimes follow the conflict between the promoters of modern improvements and the owners of old-fashioned structures who, because of sentiment or for other reasons, are unwilling to move or to sell their property. In this case the builders of a four-story brick building were able to acquire possession of land up to a line running lengthwise through the middle of the old frame dwelling, but for some reason they did not secure control of the rest of the property. Rather than let the land acquired lie idle the old house was cut in two and one half torn down. The wall of the new building was set so close to the wall of the remaining half that even the chimney, which was also cut in two, had to be joined to the new wall.

RAPID CANDLING DEVICE FOR EGG DEALERS

An egg candler designed for the use of retail grocers and country merchants enables the dealer to make a rapid test of eggs in the presence of the customer or when buying from a producer. The tester is in the form of a convenient cabinet, which can be placed on the store counter. It carries its own electric-light plant in the base, above which a tray of 36 eggs, lifted direct from a standard egg case, can be placed for examination. A swinging cover is then closed over the eggs and they are inspected through a suitable eyepiece in the top of the cover. The electric light beneath the eggs plainly reveals those that are imperfect, which can be picked out easily from the tray. Only a few seconds are required to candle the three dozen eggs handled at one time and the device can be operated by a novice.

WHEEL WITH CUSHIONED STEEL RIM

A comparatively simple substitute for a wheel having a rubber tire has been designed for use on trucks and automobiles. It consists essentially of a strongly built hub and spokes which support a felly, about which is a steel



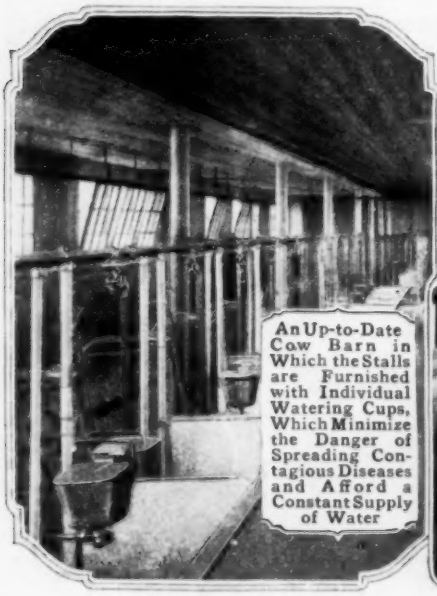
A Substitute for a Rubber-Tired Wheel Having a Rim of Steel Which Rests on Cushions Placed at the Ends of the Spokes

rim somewhat larger in diameter than the felly. Inserted between this rim and felly, and opposite each spoke, is a cushion of rubber, or other material, which gives the wheel resiliency. Flanges help to hold the cushions in place. The felly and rim are held together by bolts located between the cushions. Each bolt is rigidly fastened to the rim, but is rather loosely inserted in a slot in the felly so that there is play between the rim and felly and yet the former cannot become displaced.

INDIVIDUAL WATERING CUPS FOR CATTLE STALLS

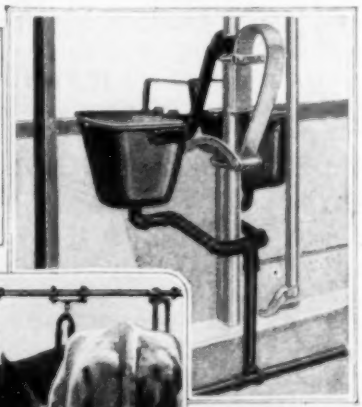
Experience of dairy farmers has fairly proved that the maximum yield of milk cannot be secured from a cow unless she has all the water she wants to drink, just when she wants it; that is, after each feeding at least. In cold weather it is poor policy to let cows run out to an icebound common drinking trough, to get chilled; and in all weathers the common trough, with its danger of spreading contagious diseases, is regarded by the knowing farmer as undesirable. Hence a system of using individual watering cups or buckets for cattle stalls is on the increase. By this plan each cow has her own covered cup, the lid being automatically kept closed, except while she is drinking. It is easily opened by the animal in whose stall it is located, but not by a neighbor. The level of the water in the cups is regulated by the quantity of water in a regulating, or control, tank, the level of tank and cups being the same. A regulating valve maintains a uniform level of water in the tank, the supply being taken from any suitable constant source, such as a spring, a stream, or a storage tank. Each watering cup is connected with the control tank by feed piping. A flange inside the upper edge of the cup prevents the cow from slopping the water out on the floor of the stall. Each cow gets fresh water direct from the protected control tank, while the water from one cup cannot flow back into the cup of another cow.

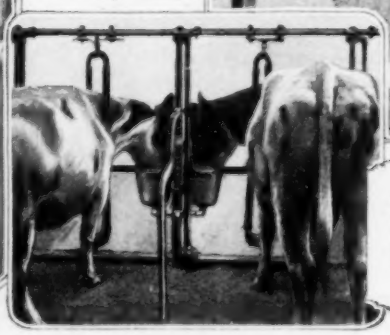
¶Much interesting historical data has been gathered into an illustrated booklet recently issued by a large eastern railway, which takes up, according to routes, most of the towns and cities on its lines. Facts about the commerce and resources of the regions traversed are also included.



An Up-to-Date Cow Barn in Which the Stalls are Furnished with Individual Watering Cups, Which Minimize the Danger of Spreading Contagious Diseases and Afford a Constant Supply of Water

At the Right, an Individual Watering Cup with Its Feed Piping: The Level of the Water in the Cups is Kept Constant by a Regulating Tank and Valve. The Cow can Easily Open the Cup to Drink, but cannot Slop Out the Water





Individual Watering Cups can be Installed in the Open Air for Summer Use, as Well as in a Barn

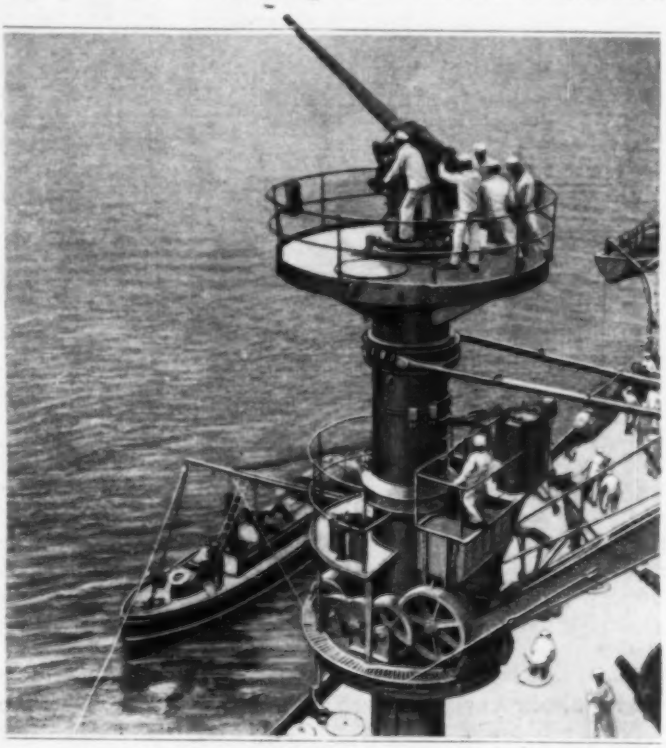
STANDARD NAMES ADOPTED FOR AUTO PARTS

In a timely attempt to standardize the names of automobile parts, a list of about 600 words and phrases has been adopted by the Society of Automobile Engineers and is recommended for general use. The nomenclature included in the list was developed at a series of meetings of engineering and service representatives of leading automobile manufacturers. It comprises the more important parts throughout the whole of a car, minor parts such as bolts and studs being indicated in general terms. Body parts have not been included generally, nor parts of some units, such as the carburetor, which vary so much in construction as to make anything like uniform nomenclature very difficult. The list as published is classified mainly according to functions. It should aid materially in securing uniformity in usage that will prevent many of the delays common in replacing parts, and also tend to greater clearness and brevity in the vocabulary of the automobile. For instance, the use of the name "engine" is recommended rather than "motor," to avoid confusion with electric motors; while the terms "foot brake" and "hand brake" are recommended instead of "service brake" and "emergency brake."

¶A congressman-elect recently traveled from Philadelphia to Washington in his own biplane, piloted by an army officer. He says he is the first man to fly to congress.

NEW NAVAL ANTIAIRCRAFT RIFLE TESTED

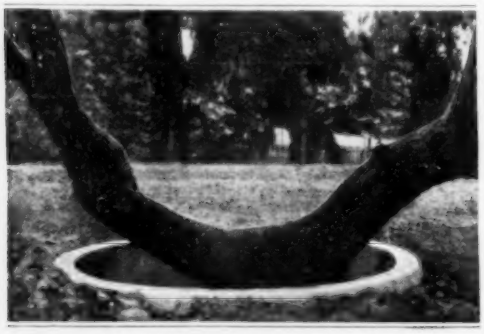
The present war has wrought many changes in the fighting equipment of all nations and perhaps none are more interesting than those which have been brought about because of the conspicuous part played by air craft. One of the weapons which fighting ships now require is the antiaircraft rifle. The 3-in. gun shown in this illustration, mounted on a special platform, 40 ft. above the deck of the battleship "Texas," is of this type. It is so equipped that it can be pointed upward at a steep angle. The weapon fires 30 shots a minute and requires a crew of seven men to operate it. If tests of this rifle prove satisfactory, other vessels in our navy will be similarly armed, for special means of defense against hostile air craft is now recognized as a necessity.



View of the New Three-Inch Antiaircraft Gun Mounted on a Special Platform 40 Feet above the Deck of the "Texas." It Fires 30 Shots a Minute and is Manned by a Crew of Seven Men

WALLS PROTECT TREES FROM DIRT FILLING

When filling a piece of property in Highland Park, Calif., with several feet of dirt the owner found that a number of fine trees were likely to be injured



Means Used in Highland Park, California, to Protect Trees on a Piece of Land Which was Filled In with Several Feet of Dirt

by the piling of so much earth about their trunks. Rather than lose them, he built an 8-in. concrete wall around each one, about 4 ft. from the trunk and 6 ft. high. This gave the trees plenty of "breathing space," and when they were irrigated the sunken areas served as convenient reservoirs for the water. Horses were allowed to run on this piece of land and so the unusual guard about each tree served to protect the roots from the pawing and stamping of the animals.

MEDIEVAL METHOD STILL USED TO CAST BRONZES

The method of casting bronze statues which Cellini and other Italians brought to such perfection nearly four centuries ago is still rather closely followed by at least one well-known foundry in this country in its production of artistic bronze figures. The first step is to take the original clay statue made by the artist and cut it into pieces from which half-and-half molds can be made. Positive wax casts are then made from these, first by brushing melted wax on the inner surface of the negatives and then by pressing in sheets of wax by hand, forming a coating from ¼ to ¾ in. thick, according to the size of the statue. The various wax parts so made are assembled and form a wax duplicate of the bronze figure to be cast. Unless it is a very small statue the center is filled with a core to save material. Workmen now provide the wax figure with gates and vents in the shape of wax rods. Bronze rods are inserted to serve as chaplets, or braces, to keep the core in place. The next step is to cover the figure with a thick coating of a claylike compound that hardens rapidly. This rounded mass, which bears no resemblance to the statue, is baked over a slow fire, thus melting out the wax and leaving a negative shell and the core

Applying Wax to Inside of Plaster Negative: After Thin Coating has been Brushed On, Thin Wax Sheets are Pressed In by Hand

The Various Wax Parts Assembled, Forming a Duplicate of the Bronze FiguretobeCast

Wax Statue After Wax Rods have been Attached to It to Form Vents. Other Rods of Bronze Serve as Chaplets

Molds Which have been Baked and from Which the Wax has been Melted. After the Bronze has been Poured In and Cools This Outer Coating is Chipped Off

The Final Step: Hand-Finishing the Bronze Figure with a Stiff Brush. The Surface is Usually Chemically Treated Also, to Produce the Color Admired by Artists

Carefully Removing Small Particles of the Molding Compound Clinging to the Surface of the Bronze. All the Work in Making Each Statue is Done by Hand—a Fact Which Adds Considerably to the Expense

Wax Replica Covered with Molding Compound, More of Which Is to be Added. After the Outer Coating has been Completed the Object is Baked and the Wax Melted Out and Replaced by Bronze

Bronze Statue as It Comes from the Mold, Which has been Carefully Broken Away Piece by Piece. The Rods and Gates will be Removed by Hand

with a narrow space between. The bronze is poured into this mold and so the statue is formed. When it has cooled, the covering is carefully broken away and the core removed. The task which remains is to remove the various gates, or bronze projections, which formed in the vents and to finish off any slight unevennesses in the surface. Fifty replicas of the statue shown in the accompanying illustrations are to be presented as perpetual trophies to the national guards of the various states. The figure is that of Eliphalet Remington, who completed his first rifle in 1816. A large copy of the statue is to be erected in Ilion, N. Y., the home of Remington.

FIRST HAWAIIAN AIRMAN GETS PILOT LICENSE

The first Hawaiian airman to receive an official pilot's license from the Aero Club of America traveled 6,000 miles

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Sen Yet Young, the Only Hawaiian Airman, Recently Made a Successful Solo Flight for His Official Pilot's License

from Honolulu to make the necessary solo flight at the Curtiss training field, Buffalo, N. Y., recently. His name is Sen Yet Young, his father being a wealthy Chinese resident of Honolulu, where the airman was born. As he is the only Hawaiian who has mastered the art of flight, he remained to study the mechanics of the aeroplane at the Curtiss factory, before returning to Honolulu, where he will have to act as his own mechanician. He will take back an aeroplane to Hawaii and expects to astonish the natives with some spectacular flights.

PANORAMIC CAMERA FOR MOTION PICTURES

With the ordinary moving-picture camera the field of sight is limited to an angle of 30°, but a panoramic camera recently perfected by a Nashville, Tenn., man is capable of taking moving pictures covering a field just five times as wide, or an angle of 150°. Five lenses are used, each set at a different angle, so as to secure the greatest possible range. The film used is 3¾ in. wide, or about three times the standard width, and the two sets of sprocket holes are of the ordinary kind. Operation of the five shutters is centralized and controlled by a single crank, which works similarly to that of the standard camera. The panoramic view is recorded in five sections which appear side by side on the wide film and harmonize perfectly when projected upon a screen of special width. At a private exhibition by the inventor in Nashville recently, the screen used was 75 ft. wide and a remarkable reproduction of a baseball game was shown. The camera had covered the entire field. All the players, the outfield, and even the flight of the ball through the air, could be seen and judged as though the spectators were seated only a few paces behind the home plate. Interior views, for photoplays, may be filmed with the same facility and completeness as outdoor scenes, the new camera being readily adaptable to studio use.

Salvaging Human Wrecks *from* War's Scrap Heap

IN THREE PARTS

By SEARLE HENDEE

PART III—Reëducating the Maimed

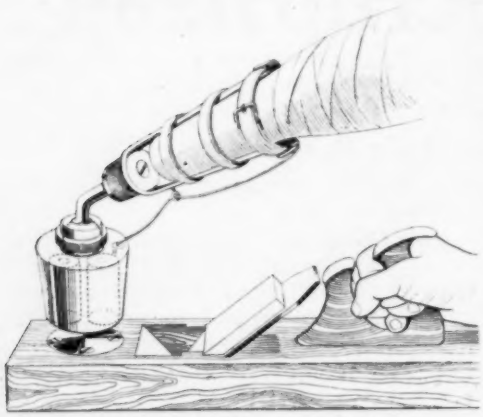
THREE months after the outbreak of hostilities, France began preparations for the reëducation of its "glorious cripples," the army of rebuilt men pouring from the military hospitals into the streets, there to feel the cruelest sting of war. One by one the other belligerent nations took similar steps; some a bit late, but all in due course. Today nearly the whole world is struggling to meet the most appalling human problem that civilization has ever faced, that of converting millions of disabled, broken-spirited soldiers into useful, self-reliant, and self-supporting civilians.

Several months ago the Danish War Study Society estimated, after careful investigation, that 11,245,300 combatants had been wounded, and of that number, 3,373,700 "hopelessly," during the present conflict. Europe's battles are being waged by men and boys of all walks of life. Leaving the hospitals are throngs of limbless, paralyzed, blind, deaf, and worn-out men. Among them are musicians whose hands are missing, railroad men whose feet are

BY COURTESY OF THE ILLUSTRATED LONDON NEWS

Figure 1 Illustrates the Supporting and Operating Harness Used with an Artificial Arm of American Invention, Shown in 2; the Elbow, Wrist, and Finger Mechanism is Indicated in 3, While Figure 4 Is a Specimen of the Penmanship of a Man Fitted with This Ingenious Member. Coins can be Picked Up, a Hat Tipped, or Papers Handled with Ease, as 5, 6, and 7 Picture

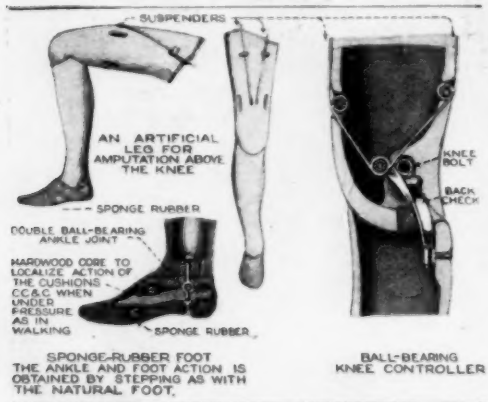
gone, telegraphers who cannot hear, and machinists who are sightless.



For Certain Kinds of Manual Work, the Magnetic Hand, a German Invention, Seems to be Practical. It is Shown Here in Use by a Carpenter

Then, too, there are those pitiful wrecks with children's minds.

Fortunately for all concerned, artificial limbs are being perfected which perform to a remarkable degree the functions of the members they replace. They are no longer designed chiefly to lessen the conspicuousness of men's deformities. This is the salvation of Europe and its shattered soldiers. The empty sleeve and the peg leg have


SUSPENDERS
AN ARTIFICIAL LEG FOR AMPUTATION ABOVE THE KNEE
SPONGE RUBBER
DOUBLE BALL-BEARING ANKLE JOINT
HARDWOOD CORE TO LOCALIZE ACTION OF THE CUSHIONS C C & C WHEN UNDER PRESSURE AS IN WALKING
SPONGE RUBBER
SPONGE-RUBBER FOOT THE ANKLE AND FOOT ACTION IS OBTAINED BY STEPPING AS WITH THE NATURAL FOOT.
KNEE BOLT
BACK CHECK
BALL-BEARING KNEE CONTROLLER

FROM THE ILLUS. LONDON NEWS

These American and European Artificial Limbs Are Among the Best so Far Devised: The Foot of the Leg Has a Sponge-Rubber Sole, a Remarkably Flexible Substitute

passed.. In their place are a highly ingenious mechanical arm fitted with a hand almost human in its movements, and a leg, with flexible joints, that enables its wearer to walk without limping noticeably.

It is gratifying to know that what the French and English consider the most admirable artificial arm yet developed is a product of a Kansas City concern. With this device a large percentage of the ordinary needs are met. Straps that fasten about the shoulders manipulate the arm, causing it to rise, stretch out, bend inward, or drop lifelike in the position of rest. The motions are imparted by the shoulder-pull thongs which in turn actuate the mechanism. In the same manner, the hand is opened or closed at will, turned at the wrist, and moved back and forth. By extending the arm the fingers are opened. By then bending or lowering it, they are closed so as to grasp firmly an article of almost any "reasonable" shape. Thus most of the daily needs can be performed quite satisfactorily, while a man who has lost only one arm is enabled to do almost whatever he wishes.

Another wonderful hand is one invented by a Berlin surgeon, Max Cohn, who lost his left forearm through an infection contracted while operating on a wounded soldier. This device is so ingenious that it has allowed its inventor to continue his professional work without serious difficulty. The fingers can be stretched out, separated, brought together, and curled in quite a natural manner, while the hand, in addition to opening and closing readily, can be turned with a wristlike motion from one side to the other. Motive power is supplied from the shoulder by means of a harness. One engineer, who lost both hands and was supplied with artificial ones of this type, found it possible to do his work almost as well as originally.

For tradesmen, farmers, and laborers, devices that bear little or no similarity to the human hand so far as looks are concerned, but which have the necessary strength for heavy work, and in some cases also the agility of motion needed for writing, are made. One of these is essentially a holder for various tools specially designed to be

Although Bearing No Similarity to the Human Arm, These Mechanical Substitutes Enable Their Wearers to Do Work of Various Kinds. Copied from an Actual Photograph, the Sketch Shows a Man Writing Legibly with an Arm Amputated Far above the Elbow, and a Girl, Whose Forearm is Missing, Crocheting. These and Other Equally Delicate Operations can be Performed Readily

The Man Pictured in the Upper Left-Hand Corner of This Page is Using the Type of Arm for Which the Implements Illustrated Above are Intended. The Gloved Hands are Designed Only for "Dress Parade," for Their Fingers Are Actionless and They Merely Tend to Conceal Deformity

PHOTO COPYRIGHT MEDEM PHOTO SERVICE

Here Is a Well-Known French Motor-Car Driver Who Lost Part of His Right Arm in Battle. The Mechanical Substitute Which He Wears Enables Him to Control a Machine Easily

Mechanics and Others Whose Work Depends Largely upon Their Arms and Legs have been Crippled. But Many of Them are Learning to Pursue Their Occupations with the Aid of Artificial Members

Bicycle Riding is Not Barred to Armless Men: Even Soldiers Who have Lost Both Hands and a Foot can, with the Aid of Artificial Limbs, Use a Cycle. To Many the Vehicle Is a Great Benefit

fitted to it. Different forms of grips also permit the use of shovels, carpentering tools, and other implements. Another consists of a jointed steel bar that can be adjusted to different positions. It has a ball-and-socket joint in the stump to which it is fixed, and at the opposite end a crab-claw grip. To most of these a gloved hand can be attached for street wear.

Quite interesting is a magnetic hand, introduced in Germany, that has proved helpful to certain classes of workmen. It is provided with a strong magnet mounted on a ball-and-socket joint so that the poles can be brought into any necessary position. With it, metallic articles, or those of other materials fitted with metal plates, can be raised, moved about, or held firmly. Current is supplied through a flexible cord and is switched on or off at will. For many operations, such as handling sheet metal for stamping machines, and doing planing, filing, and similar work, the appliance operates very satisfactorily. Magnetic tweezers, pinchers, and fingers are also used. A portable battery provides current when a lighting circuit is not available.

BY COURTESY OF OFFICE APPLIANCES

Here Is One of the Special Typewriters That have been Devised for Crippled Men: It can be Successfully Operated with One Hand and a Leg

As for artificial legs, one of the most ingenious can be used almost without exciting notice. A cushioned knee hinge joins the thigh and lower portions, while a lever, pivoted in the former and connected with a spring inside the calf, allows it to be bent naturally. A central ankle pivot, which makes possible an easy stepping movement, is provided in the foot. Rubber cushions beneath the heel and instep absorb the shocks. The foot piece of another leg of this sort has a double ball-bearing ankle joint which provides for sidewise motion. Similar to this is one with a rubber-ball joint that has almost the pliability of the human ankle.

Not long ago a New York business man who had just returned from central Europe remarked, during a conversation, that he had seen comparatively few maimed soldiers in Germany and Austria. Had this man gone a short distance from Berlin or Vienna, however, he might have discovered whole villages of them. Right at this time war cripples are not being placed on exhibition for American travelers. "Cripple Town" is to be found almost anywhere except in the capitals and big cities of the Continent. In some instances these camps of limbless men are situated on large estates in the countryside. England, France, Germany, and Austria each has 50 or more of them, some accommodating several thousand soldiers and sailors. Belgium has a few, Russia may have many, and Italy is establishing them. They are the places where the reclaimed soldiers are taught to use their mechanical limbs and make themselves self-supporting civilians.

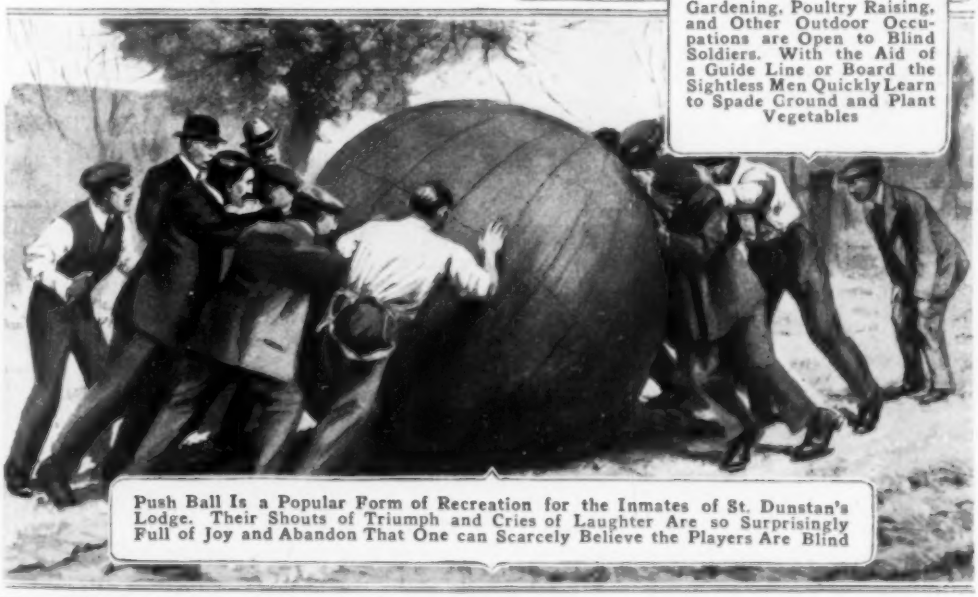
The reëducation of Europe's millions of maimed thus includes both their mental and physical training, or retraining, as the case may be. In the main there are three general classes of cripples: those who have been accustomed to mental work, those who have done physical work but are capable of the former, and those who have done and must continue to do physical labor. Of the three, the last group offers the greatest difficulty. In all cases, how-

The Pictures on This Page Illustrate What is being Done at St. Dunstan's Lodge in Regent's Park, London. Above Is to be Seen the Anatomy Class in Session. The Men, All of Them Blind, are being Given Professional Instruction in the Art of Massage

ever, the first step is to endeavor to devise some means of enabling an individual to resume his former occupation. When this effort fails, the next move is to find work, as nearly analogous as possible to that formerly pursued, that can be undertaken successfully. Often this tests the ingenuity of the instructors and the patience and courage of the apprentice to the extreme.

One of the most interesting things in connection with this great undertaking is that the blind are teaching the blind and the crippled instructing the crip-

Gardening, Poultry Raising, and Other Outdoor Occupations are Open to Blind Soldiers. With the Aid of a Guide Line or Board the Sightless Men Quickly Learn to Spade Ground and Plant Vegetables



Push Ball Is a Popular Form of Recreation for the Inmates of St. Dunstan's Lodge. Their Shouts of Triumph and Cries of Laughter Are so Surprisingly Full of Joy and Abandon That One can Scarcely Believe the Players Are Blind

PICTURES COPYRIGHTED IN THE UNITED STATES AND CANADA BY THE ILLUSTRATED LONDON NEWS

The Presence of Artificial Arms and Legs Instead of Real Ones No Longer Spells Uselessness to the Ex-Service Man. Maimed Soldiers at One of the Cripple Camps are Shown Here Absorbed in Schoolwork

pled. Maimed men are the most successful tutors of the downhearted "amputés" who come fresh from the hospitals, their movements awkward, their courage dying. With a sympathetic bond existing between teacher and pupil, and all of the psychological forces acting in the right direction, veritable wonders are accomplished. When a fellow with legs and arms that work with gears and levers begins to see what his companion in misery can do with similar appliances, he usually gets a grip on himself and lays to with his whole soul. And were it not for such encouragement, many of Europe's maimed could never undergo the metamorphosis that restores manhood and usefulness.

Some of the most marvelous attainments in readapting these men for the workaday world are being wrought at St. Dunstan's Lodge in Regent's Park, London, where the British are teaching blind ex-service men to do useful, profitable work.

In some of the shops the men are engaged in basket weaving, shoe repairing, wood joining, and mat making. In another department they are taught to read and write according to the Braille system, to operate a Braille shorthand machine, and to use ordinary typewriters. Then there is a model farm on the grounds where instruction in gardening, poultry raising, and the care of stock is given. It seems incredible, but these blind men soon are able to distinguish different fowls by touch, to drive chickens from one coop to another, gather eggs, and attend to an incubator. A knotted string or a notched board is used to enable sightless gardeners to spade plots of ground properly and do the necessary planting.

In determining the kind of work best suited for certain types of cripples, motion study has accomplished much.

SETTLING BASINS CLEAR DESERT WATER OF SILT

An interesting and important problem which appeared following the development of irrigation projects in the Imperial Valley in southern California, was how to supply drinking water to the population supported by this region which once was desert. The objection to using the water just as it came into the ditches from the Colorado River is apparent, for in its wild race through the Grand Cañon it becomes heavily laden with silt and is chocolate-colored. By the time it reaches Brawley, for example, in the northern part of the valley, it has almost the consistency of molasses. The drinking-water problem for this town of approximately 3,000 persons has been solved by running the water into settling basins about 200 feet square. The amount allowed to flow into the basins when once they are full, is equal to that drawn out, which is about 200,000 gallons per day. At the end of a basin opposite the inlet is a raft which supports a vertical pipe, the end of which is submerged in the water about 6 in. Through this the surface water, which is the clearest, is drawn into a standpipe, that supplies the city mains. About 30 inches of silt will accumulate in one of these beds in a year.

ADDING MACHINE WITH SIMPLE KEYBOARD

An adding machine with a keyboard of unusual simplicity places the decimal point in a row of figures automatically. There are only 10 figure keys on the keyboard, instead of 80 or 100 as in other cases, and because of this fact it is claimed that the speedy touch method can be used in figuring, thus

Adding and Calculating Machine of Simplified Construction, Having Only 10 Figure Keys to Operate, and Capable of High Speed by the Touch Method

One of the Settling Basins at Brawley, California, into Which Silt-Laden Water is Run before being Pumped into the City's Water Tank

View of One of the Emptied Settling Basins, Showing a Deposit of 30 Inches of Silt Which Accumulated in One Year

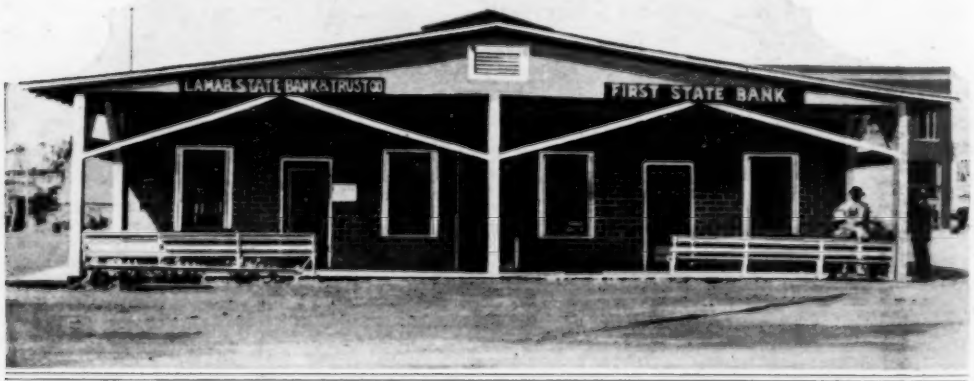
increasing the efficiency of this calculator for office use. To introduce a number or a series of numbers into the machine, it is necessary only to strike in their natural order the keys corresponding to the figures composing the number. No attention need be paid to decimal order, in writing dollars and cents, for instance, because by an ingenious system of control by levers and stops the mechanism takes care of this, placing the figures in their proper columns—units under units, tens under tens, and so on—without the operator giving it the least concern. The machine also performs all the usual operations of a mechanical calculator, and makes a printed record of the work done.

FOUR HOMELESS BANKS OCCUPY ONE BUILDING

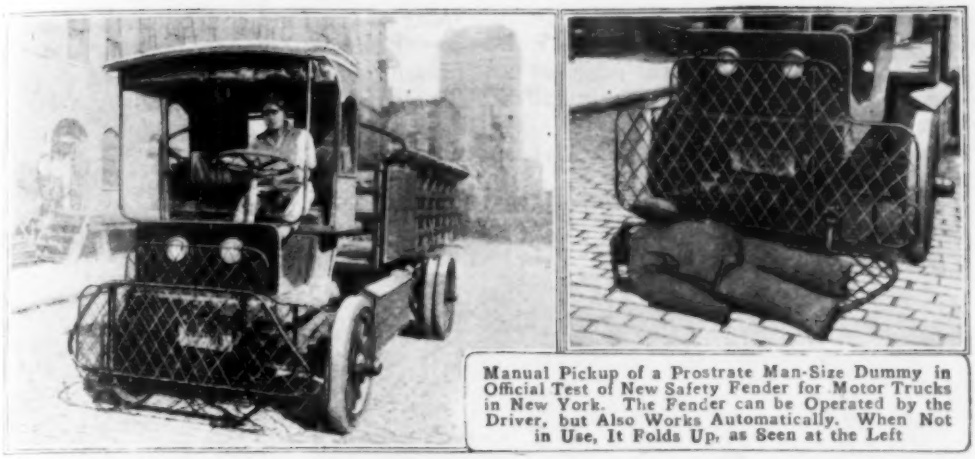
The erection of a bank building which housed four rival banks and contained a single brick vault in which their funds were kept, was one of the unusual results of the fire that swept over Paris, Tex., last spring. Included among the 1,440 structures destroyed were the homes of these four banks. Permission was granted them to erect a temporary structure and vault in the public plaza. A short time after the fire, a building, 50 by 100 ft., was begun, and it was ready for occupancy 72 hours later, the work having been rushed by night with the aid of searchlights, as well as by day. The walls were of hollow tile. The brick vault measured 20 by 24 ft. To meet the emergency, large sums of ready money were expressed to the banks, and their reports showed that they had $4,000,000 in cash stored in the vault at one time.

SAFETY FENDER FOR AUTO BUSSES AND TRUCKS

Tests were recently made by a committee of the New York Public Service Commission of an automatic safety fender designed for use on auto busses, auto trucks, and street cars, and its adoption was recommended as a "distinct advance in existing means for safeguarding the lives and limbs of persons who are struck or come in contact with such vehicles." This new fender is operated by means of springs and a trigger trip which simultaneously drops the fender and sets the brake. It consists of a lifeguard hanging vertically in front of the bumper of the car, bus, or truck, and an apron extending horizontally at any required height above the pavement and projecting 26 in. in front of the bumper. In the official tests the apron was carried 7 in. above the pavement. Lifeguard and apron are made of woven wire, with diamond-shaped mesh. The guard is suspended from flat spring



View of Temporary Building Erected after a Big Fire in Paris, Texas, to House Four Banks. The Single Brick Vault in the Structure Contained $4,000,000 in Cash at One Time



Manual Pickup of a Prostrate Man-Size Dummy in Official Test of New Safety Fender for Motor Trucks in New York. The Fender can be Operated by the Driver, but Also Works Automatically. When Not in Use, It Folds Up, as Seen at the Left

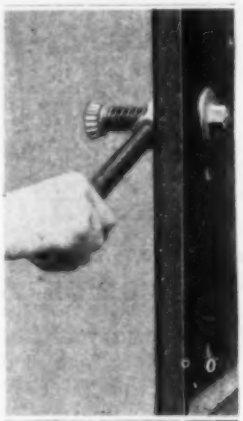
hangers, giving a cushion effect in front of the vehicle, and the apron rests against long coil springs which also serve as a cushion when the fender strikes any person. A simple locking device prevents the fender from tripping automatically on rough paving.

THALLIUM USED IN MAKING TUNGSTEN BULBS

An interesting example of the use which is being made of various chemical by-products that formerly were thrown away, is found in the utilization of thallium from certain zinc ores. A small amount of a thallium-chlorine compound is used in making a tungsten incandescent lamp. When it has been added in the proper proportion this substance partially volatilizes and slightly decomposes. The chlorine, on being set free, combines with the brown deposit that settles on the inside of the glass bulb, forming a combination of chlorine and tungsten. This compound circulates through the lamp and after a time comes in contact with the incandescent wire and is decomposed there, by the heat, and so the tungsten is deposited on the filament from which it was originally volatilized. In this way, through the agency of this compound, chlorine over and over again causes the tungsten to return to the wire from which it was given off.

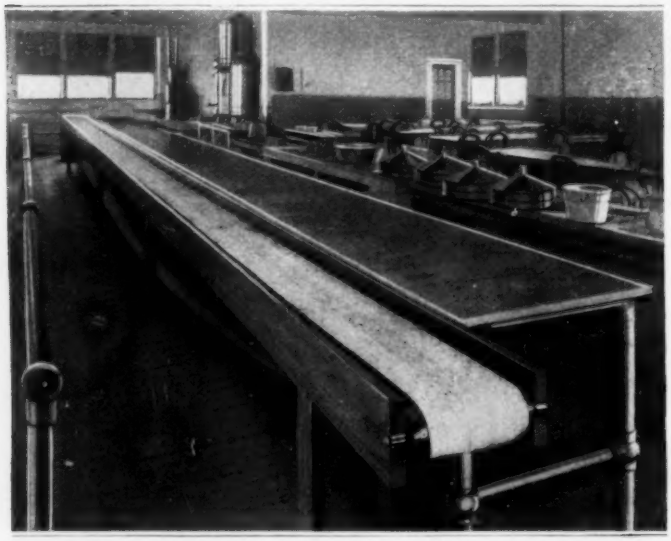
HANDY NEW CUTTING TOOL FOR METALS

With a new and easily operated tool invented by a Milwaukee man, holes of various sizes can be readily cut through plates of metal, fiber, or slate. It is designed especially for making additional holes in cabinets, lockers, tanks, or cases of any kind, in which it has heretofore proved troublesome to cut holes after they were finished and set up. To use the tool a pilot hole is first drilled through the material and the stud is inserted. A flange nut is then secured on the opposite side of this stud and a few operations of a ratchet wrench cuts out a neat hole. The knives, which may be adjusted for cutting holes of different diameters, are held in a swing chuck and are fed automatically by means of the spring shown in the illustration between the swing chuck and the sham nut. It is claimed that the tool will do the work of a 6-in. drill press and that many uses will be found for it in various industrial plants.



BELT CARRIES TRAYS OF CAFETERIA PATRONS

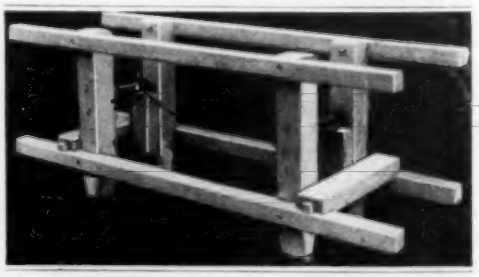
A belt conveyor has been installed in a cafeteria in Johnson City, N. Y., to carry the trays of its patrons while they select their food. It serves a two-fold purpose by preventing loitering in front of the food counter and by holding the trays level so that there is no spilling of the contents of the dishes. The cafeteria is conducted by a large shoe factory. The patrons, chiefly employes in the factory, pass in single file in front of a long steam-heated counter on which is the food supply. Between the patrons and this counter is the traveling belt, which is 45 ft. long and is supported on rollers set 12 in. apart. Persons selecting food place their trays on this conveyor and walk along beside them at a moderate pace, while such dishes as they may indicate are placed on their respective trays. On reaching the end of the belt each person carries his meal to a table. Under the new system 840 employes have been served, without confusion, in 45 minutes. Formerly there was much congestion at the noon hour.



New Conveyor in a Johnson City, New York, Cafeteria Which Carries the Trays of Its Patrons, Thereby Preventing Congestion and the Spilling of the Contents of the Dishes

CAR PRESS MAKES ROOM FOR ORANGE BOXES

A frequent cause of damage to oranges in transit to markets has been the rocking of the orange boxes, through loose packing in the car, which resulted in bruising the fruit. An orange-shipper's car press, the recent invention of a Redlands, Calif., man, is therefore proving very useful to the fruit-shipping concerns of the citrus districts of that state, and to the railroad companies. Oranges are usually shipped in refrigerator cars holding 480 boxes. In loading, the boxes are placed in rows two high, and a car tie or strip is nailed across each row to hold them in place. When the rows from each end of the car approach each other in the center, the car press is shoved into the empty space and operated by hand, after which there is room for three or four additional rows of boxes. When these are inserted, the carload is packed so compactly that the boxes cannot rock and the danger of bruising the fruit is practically eliminated. The press is a framework of heavy wood,



This Car Press Squeezes Outward with a Pressure of Two Tons and Makes Room to Pack California Oranges Tightly in a Car

but easily handled, with jackscrews that squeeze the side timbers outward with a pressure of two tons.

PARK SEATS RESERVED FOR WOMEN AND CHILDREN

The officials in a western city have set aside certain seats in one of the city parks for the exclusive use of women and children, and their escorts. This fact is announced by a large sign placed in the middle of the walk on which the reserved benches face. This arrangement is similar to that existing in some other cities, which have recognized that women, and children as well, in a public park are not always free from annoyance by strangers. A ruling which excludes all men, except those who are acting as escorts, from certain sections or seats, serves to make a park more attractive to women

Sign in Park Which Designates Certain Benches, Where Women and Children may Rest with Little Risk of being Annoyed by Strangers

and children, and insures for them places where they can sit undisturbed.

WRIST WATCH MADE TO BE CARRIED IN POCKET ALSO

A wrist watch has been designed by a New York watch manufacturer which can be worn either in the breast pocket of the coat, in the vest pocket, or on the wrist. The convenience of having one timepiece which can be carried when one is dressed for social functions, for business, or for outings, is apparent. Attached to the watch is a neat leather strap which serves as a wrist band or as a chain. On the end of the strap is a special hinged clasp which makes it possible to double the guard into a loop of any desired length after passing it through a buttonhole or through the metal link on the edge of the case, opposite the stem. When

A Watch Designed so That It can be Worn on the Wrist, in the Breast Pocket, or in the Vest Pocket

one desires to carry the watch in the pocket this metal link on the case can be adjusted so that it is practically invisible. If desired, the timepiece can be fitted with a crystal described as unbreakable and made of a substance that is nonexplosive.

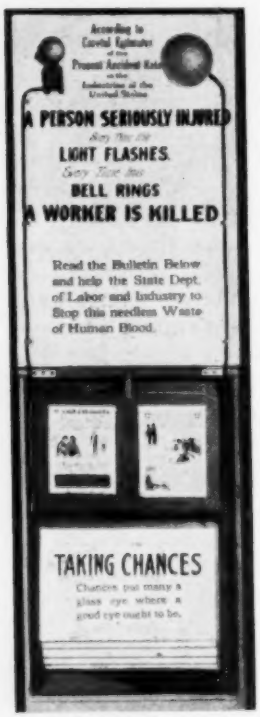
REMOVING FIRE HOSE FROM CASE TURNS ON WATER

A fire-hose cabinet, which has received the indorsement of several fire underwriters, is so constructed that as soon as the hose is drawn out of the cabinet water begins to flow through it. In this way no time is lost in preparing to fight the flames. In the case, at the end of the water pipe to which the hose is attached, is a valve that is connected with the flexible tubing by a short steel cable. When the tubing

has been removed for practically its whole length, the valve is automatically thrown open and the water begins coursing toward the nozzle. It requires but three seconds to get 50 ft. of hose ready for action. The cabinet is equipped with rubber-covered spring supports which hold the hose in neat, compact folds without injuring it. The outfit is suited for use in a home, as well as in a store or factory.

ACCIDENT TOLL SHOWN BY AUTOMATIC DISPLAY

A mechanically operated safety-first exhibit has been devised by two employes of the labor department of the state of Kansas, which tells in a remarkably vivid manner the need of taking precautions against accidents. It consists of a vertical display case, in the upper half of which is installed an electric bell and an electric light. A printed explanation between the two declares that some one in the United States is injured every time the light flashes, which is every 15 seconds, and that a worker is killed every time the bell rings, which occurs every seven minutes. These calculations are based on the present accident rate. In the lower half of the case a slowly revolving frame brings into view, one at a time, a series of pictures, each of which is accompanied by an appropriate safety-first legend.

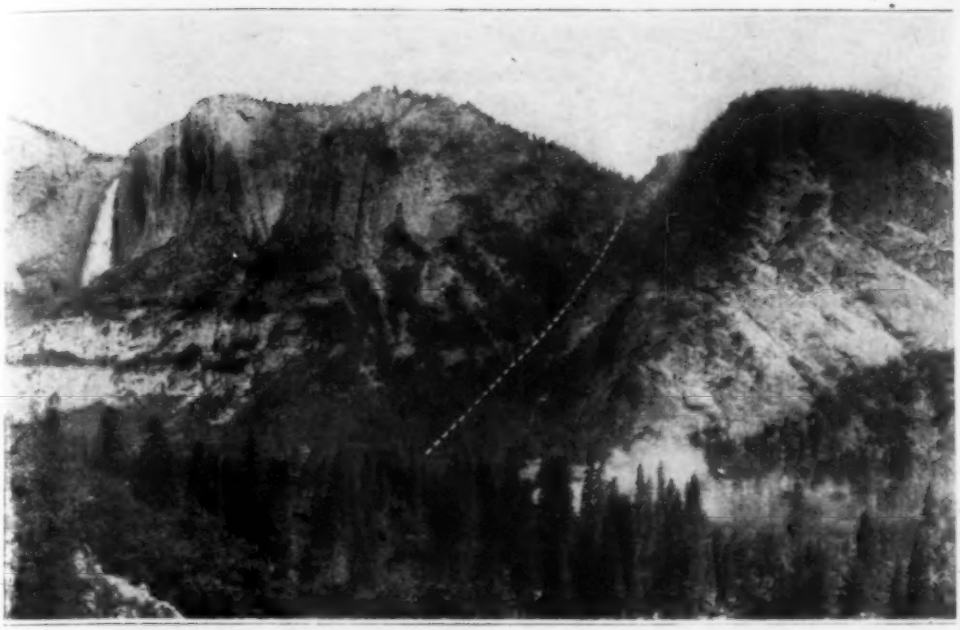

A PERSON SERIOUSLY INJURED
LIGHT FLASHES
BELL RINGS
A WORKER IS KILLED
Read the Bulletin Below and help the State Dept. of Labor and Industry to Stop this needless Waste of Human Blood.
TAKING CHANCES

DISTINCTIVE THEATER FOR MOTION-PICTURE PLAYS

A motion-picture theater has recently been opened in San Francisco in which several features common to the ordinary theater have been omitted or altered. The purpose of this has been to provide for the best possible presentation of the films and also to give the playhouse a distinctive character. There is no stage, and not even an archway such as usually sets off a screen. The pictures are thrown upon the wall nearest the street and as one passes through the curtains at the entrance he finds himself at the front row of seats instead of at the rear. Easy inclines take the place of stairs and lead to the balconies at the rear and sides. The pit for the orchestra is set low and accommodates 20 musicians. Organ pipes are concealed behind grillwork either side of the screen. All of the decorations are in pastel shades.

INCLINE TO SHORTEN ROAD TO YOSEMITE PARK

A new mountain road and a double-track incline railway have been projected for Yosemite National Park, which when completed will shorten by 45 miles the route that westbound motorists on the Midland Trail follow when going to the park. The proposed short cut, for which it is believed the government will make the necessary appropriation of $200,000, will lead from a point north of the valley, known as Porcupine Flat, directly down to the floor of the valley. This direct route is but six miles long. At present cars are required to follow a great loop, 51 miles long, to arrive at the same destination. About five of the six miles will be roadway and the remaining 6,000 ft. will be traversed by a tramway that will be built on a 50-per-cent grade, which means that it will make a drop of 3,000 ft. Between the Indian Cañon, which the tramway will follow, and the Yosemite Falls is a great shoulder of rock on which it is proposed to erect a hotel. The railway



View in Yosemite National Park with Dotted Line Indicating Route of the Proposed Incline Railway, Which, with a Connecting Road, will Shorten One Route to the Park by 45 Miles

will be operated by a 1,500-hp. plant which will receive its power from one of the minor falls in the region. The cars of the incline will be constructed so that they can carry automobiles, and their estimated capacity will be 500 motor cars a day. The altitude of the starting point of the new road is 8,000 ft. The first two miles of the highway leading up from the head of the incline will be at an 8 and 10-percent grade. The remainder of the route will be practically level.

DEVICE FOR CUTTING WIRE BARRIERS FOR TRENCHES

A device for cutting wire entanglements, such as are erected to guard the trenches in Europe, has been invented by a resident of Kansas City, Mo. The cutting parts resemble the toothed blades of a farm mower and are attached to a wooden frame that fastens to the body of the soldier or other person operating it. The frame holds the blades in a vertical position and as the teeth come in contact with an entanglement, a lever is drawn forward and backward, producing a shearing motion which severs the wires.

Device for Severing Wire Entanglements Which will Cut Several Wires at a Time and will Protect the Wearer from Electrical Shocks

The frame being of wood, the wearer is protected against electrical shocks. It is claimed that one can cut his way through barbed-wire entanglements with this device, as fast as he can walk.

Mahogany Sewing Table in Which Is Ample Room to Keep Work Materials. The Handles beneath the Leaves Make It a Convenient Table to Move

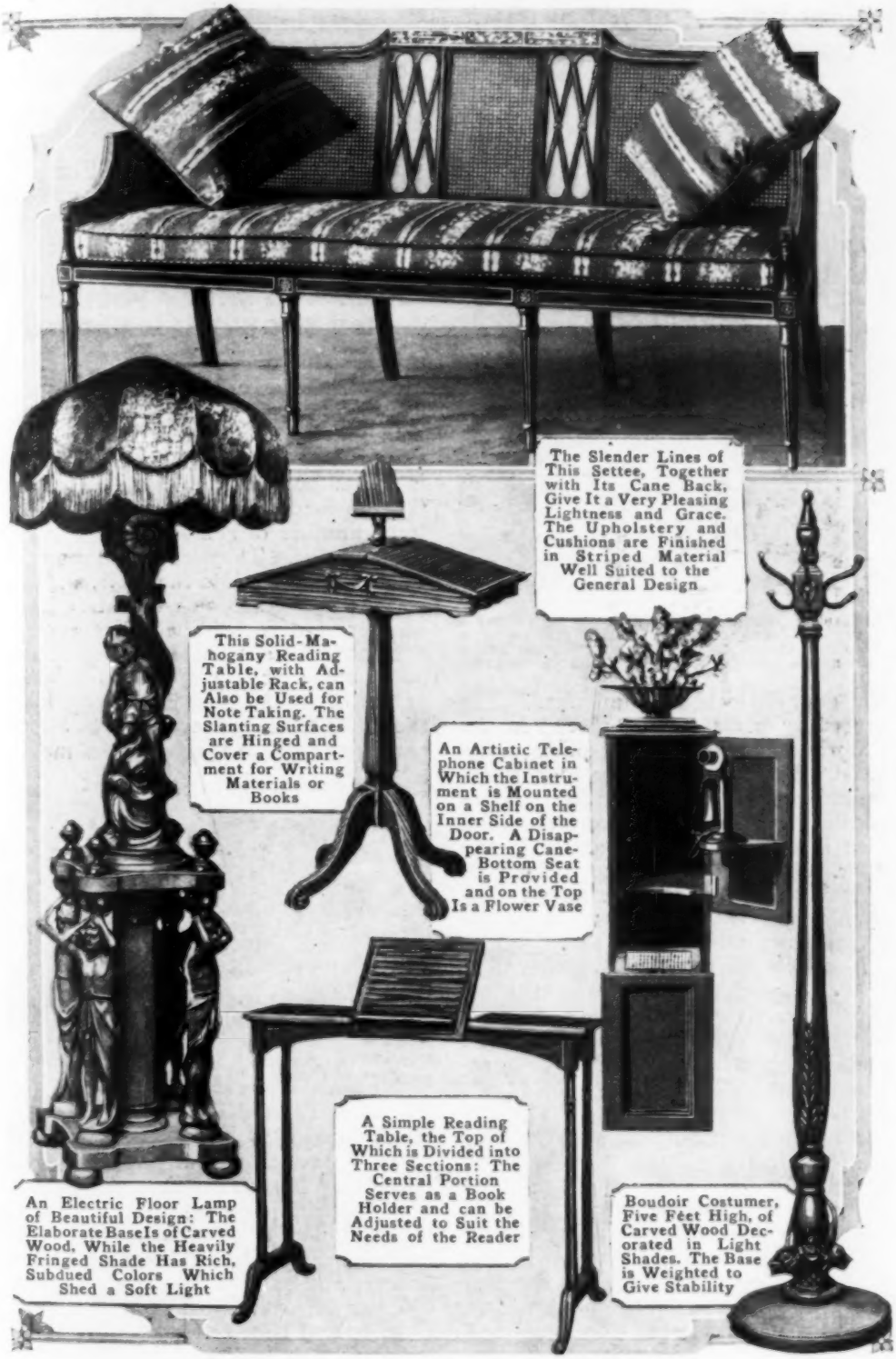
Smoker's Cabinet Having a Spacious Humidor in the Upper Part, Convenient Shelves Below, and a Pipe Rack on the Inner Side of the Door

This Handsome Console Table, Together with the Artistic Cane-Back Armchairs, and Mirror, will Give a Suggestion of the English Style of the Early Nineteenth Century

Novelty and Convenience Characterize This Little Writing Desk. When Open, as Shown Above, Places for Writing Paper, Ink, and Pens are Revealed. When the Leaves are Closed, as at the Right, It Occupies Small Space

An Odd-Shaped Table, 32 Inches Long and 25 Inches Wide, with Top and Shelf Decorated with French Prints Covered with Glass. It Is Suitable for a Boudoir or Living Room

FOR VARIOUS ROOMS IN THE HOME



The Slender Lines of This Settee, Together with Its Cane Back, Give It a Very Pleasing Lightness and Grace. The Upholstery and Cushions are Finished in Striped Material Well Suited to the General Design

This Solid-Mahogany Reading Table, with Adjustable Rack, can Also be Used for Note Taking. The Slanting Surfaces are Hinged and Cover a Compartment for Writing Materials or Books

An Artistic Telephone Cabinet in Which the Instrument is Mounted on a Shelf on the Inner Side of the Door. A Disappearing Cane-Bottom Seat is Provided and on the Top Is a Flower Vase

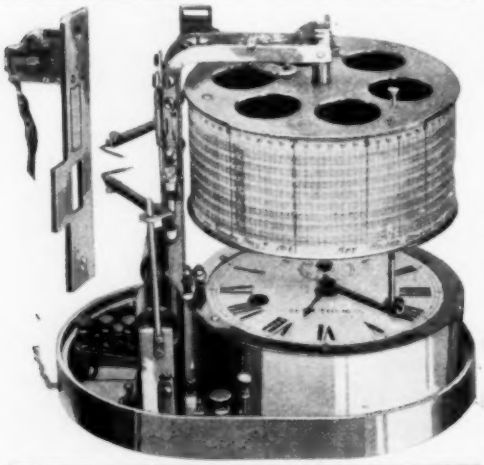
A Simple Reading Table, the Top of Which is Divided into Three Sections: The Central Portion Serves as a Book Holder and can be Adjusted to Suit the Needs of the Reader

An Electric Floor Lamp of Beautiful Design: The Elaborate Base Is of Carved Wood, While the Heavily Fringed Shade Has Rich, Subdued Colors Which Shed a Soft Light

Boudoir Costumer, Five Feet High, of Carved Wood Decorated in Light Shades. The Base is Weighted to Give Stability

NEW DEVICE RECORDS TIME OF OPERATING DOOR LOCK

An electrical mechanism has been devised, which when attached to a door lock, makes a record each time

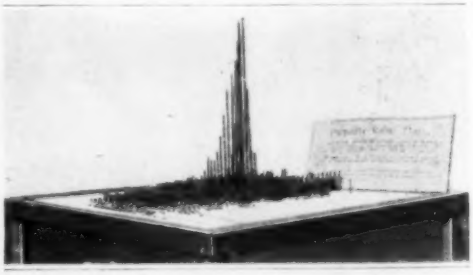


Mechanism Which Makes a Record Each Time a Door is Locked or Unlocked by Puncturing a Revolving Drum. A View of the Electrical Device Connected with the Keeper is Shown at the Left

the door is locked or unlocked. The recording parts can be placed in the proprietor's or manager's office if desired. No supplementary lock is required, such as some similar devices employ. An electrically connected device is attached to the keeper in the door jamb and either the locking or unlocking of the door makes an electrical contact. This causes a needle to puncture a time sheet placed about a revolving drum, which, together with a nine-day clock, constitutes the recording parts of the protector. This mechanism is inclosed securely in a metal case so that it cannot be tampered with. The drum makes two revolutions every 24 hours. The apparatus will run nine days without attention, then the drum must be reset and a new time sheet supplied. The protector is supplemented by an electric bell which is connected by wiring with all windows and doors. If one of these is left unlocked when the person closing the establishment passes out and locks one of the protected doors, the bell will ring instantly, thus showing that one or more of the windows or doors have not been properly secured. When a watchman is employed to enter the place at stated hours the protected lock is so equipped that the watchman's key will cause a differently shaped needle to puncture the time sheet, while the regular needle does not operate.

TALL AND SHORT POSTS ON MAP SHOW LAND VALUES

The value of real estate in all parts of Pasadena, Calif., and its suburbs has been graphically portrayed by a novel map that forms a part of a municipal exhibit in that city. The map proper is spread out on a table, 45 in. square. On the face of it have been placed a large number of slender posts of various lengths. They are held upright by needles stuck into the table, and can be moved as occasion warrants. Each quarter of an inch in height represents a front-foot value of $10, so that the posts show at a glance the relative values of all the land in the city from the down-town property, worth $1,000 per front foot, to that near the moun-



Map of Pasadena Which Shows the Value per Front Foot of Land in All Parts of the City, by Means of Posts of Various Lengths

tains, worth $5. Small tags attached to each post state the prices so that measuring is unnecessary.

¶A magnificent new passenger train, embodying the latest ideas in travel luxury, and said to have cost $2,500,000, has been put into service between Chicago and New Orleans.

Different Ways of Mounting the Sign so as to Apprise Motorists of Just What to Expect on the Road Ahead are Illustrated beneath the Drawings Presented Above. General Adoption of the System would Eliminate the Ununiform and Confusing Devices of Various Forms Now Used

UNIVERSAL HIGHWAY SIGNS PROPOSED FOR ADOPTION

As motor-car touring has increased, the need of simplified and standardized traffic signs along our highways has become very apparent. It is therefore interesting to study an ingenious code of signals lately devised in the East. These wordless semaphores clearly suggest the advantages that would accrue with the national adoption of some simple, uniform system. A diamond-shaped sign, with one triangle enameled red and the other white, is utilized. When in vertical position with the red half pointing downward, the sign gives warning of the proximity of a schoolhouse. A reversal of this position indicates a street crossing. Two of the diamonds mounted side by side with their red ends pointing upward announce a railway crossing. A curve to either the right or left in a road is indicated by placing the device horizontally and pointing the red end in the direction of the turn.

ARTESIAN WELL BRINGS UP FISH AFTER EARTHQUAKE

Following a recent earthquake shock which was felt up and down the Pacific coast an artesian well near Tulare, Calif., has intermittently spouted up small fish. A hundred or more of these creatures have been brought to the surface. They are about four inches long and have no eyes, in which respect they resemble fish found in Mammoth Cave, Ky. Biologists in the University of Southern California state that they undoubtedly come from some underground river, the course of which was altered by the earthquake so that its waters have mingled with those of the artesian well.

POCKET TIMEPIECE WHICH WINDS ITSELF

A watch, which relieves the wearer of all responsibility as to winding it, has been invented by a jeweler in New Braunfels, Tex. The timepiece will wind itself if worn by a person for an hour or so each day. The motion of the body in walking and in shifting of posture serves to swing a little pendulum back and forth and this in turn operates a simple mechanism which slowly winds up the spring. When the winding is completed this mechanism is disconnected until the watch has partly run down and then it begins to operate again. A third hand on the face of the watch shows to what degree it is wound up. If the watch is not carried long enough to keep it from running down it can be wound by hand in the usual manner.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Hand-Decorated Hanging Drum Aquarium, a Japanese Oddity for the Sun Room. It is Priced at $6.75

This Aluminum Cover Enables a Milk Bottle to be Conveniently Used in Place of an Open-Top Pitcher

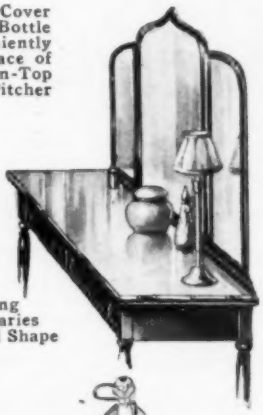
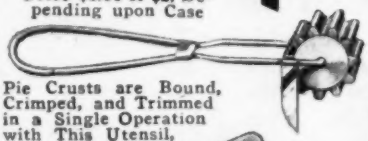


Plate-Glass Tops for Dressing Tables and Similar Furniture Protect Polished Surfaces without Lessening Their Beauty. Cost Varies According to Size and Shape

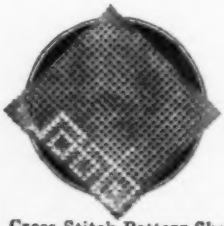
The Spring Attachment Fitted to This Bill Case Prevents It from Illicit Removal from One's Pocket. Price $1.50 or $2, Depending upon Case

Dainty Ribbon-Trimmed Slipper Trees with a Novel Coat Hanger, a Gift Suggestion. Available in Different Colors, Artistically Boxed, at $5



Pie Crusts are Bound, Crimped, and Trimmed in a Single Operation with This Utensil, Which Is to be Had Postpaid at 15 Cents

A Wire Holder Supports the Water-Shedding Paper Garbage Bag While Refuse is Scraped into It. Water Drains through Holes in the Sack. An Enameled Frame and 33 Bags Cost 50 Cents



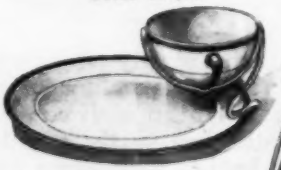
Cross-Stitch Pattern Sheet Four by Six Inches in Size. Application of Hot Water Causes Material to Vanish After Work has been Finished. A Six-Sheet Package Is 25 Cents

Easel Toilet Case, for the Traveling Bag, Which can be Placed in Upright Position on a Dressing Table. Including Articles Illustrated, the Price Is $10

Adjustable Casters Permit a Table or Other Piece of Furniture to Stand Solidly on an Uneven Floor. Set of Four, $1

Sanitary Medicine Dropper That Serves Also as a Bottle Stopper. It Retails at Five Cents

This Electric Toaster Accommodates Six Full Slices of Bread at One Time. It is Priced at $32

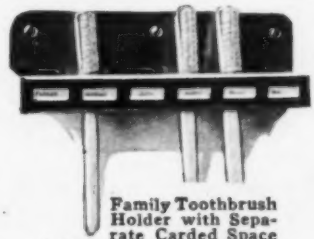


This Silver-Wire Holder may be Fastened to a Plate so as to Support a Teacup When Refreshments are Served Informally. It is Offered at $2

Light Diffuser Which may be Attached to High-Power Incandescent Lamps of Different Types to Shield One's Eyes from Brilliant Rays

INTENDED FOR THE HOME AND ITS MEMBERS

This Refrigerator Has a Sliding Rack Fitted in a Special Compartment for Milk and Butter. Price of 100-Pound Size Is $30



Family Toothbrush Holder with Separate Carded Space for Each Member of Household. This Size, 35 Cents

This Fountain Pen Has a Reservoir Which will Hold a Small Bottle of Ink. It Is Not Yet on the Market

Ten Sanitary Drinking Cups Bound in Book Form, Very Convenient When Traveling or Motoring. The Package Costs 10 Cents

This Gaily Decorated Book End Represents a New Handicraft. Ready for Decorating, It is Priced at $1

For Household Work as Well as for Tinkering with the Car, Overalls—Especially Designed for Women—Are Convenient. They Cost $1

This Ankle Brace Differs from the Usual Type in That It Is Not a Part of, or Attached to, the Skate. The Price: 75 Cents a Pair

Even Coat Hangers can be Sightly, Not to Say Odd and Artistic, if One Wants Them. This "Flower Basket" Hanger in Colors Costs $2

This Telephone-Desk Outfit Consists of a Directory, Two-Year Card Calendar, Filing Hook, Loose-Leaf Calendar, Tray for Clips, Pencil Holder, and Memo Pad. Price $2.50

Here Is a Decorated China Tea Set Which Is Distinctive as Well as Artistic. The Three Pieces are Priced at $11

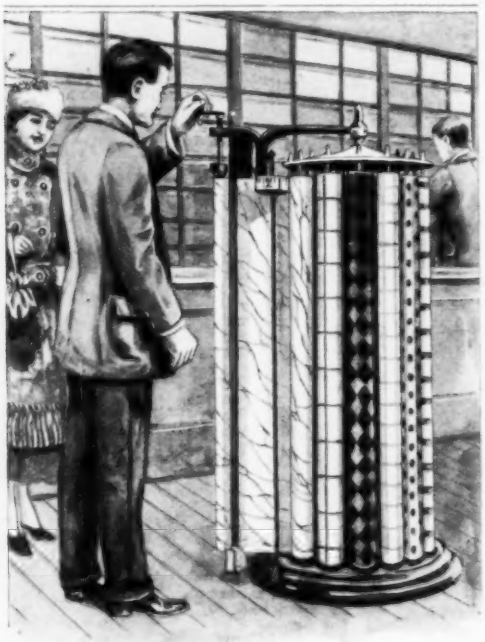
This Suitcase, Arranged Like a Wardrobe Trunk, Permits One's Clothes to be Carried without being Wrinkled and Crushed. The Price: $25

New Kitchen Cabinet with Small Drawers Nested in One Big One Which Slides Forward When the Top is Extended

Nail Brush with Pumice Stone Fitted to Back. It Costs a Quarter

OILCLOTH RACK EQUIPPED WITH SPECIAL FEATURES

A convenient cylindrical rack for holding oilcloth has been invented, special features of which are a cutting



A Revolving Display Rack for Oilcloth, the Special Features of Which Are a Measuring and a Cutting Device

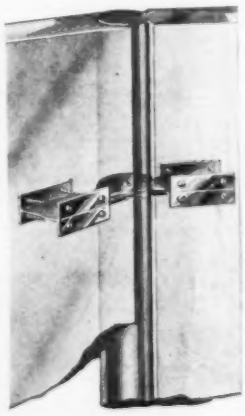
device and a measuring device. The rack has a capacity of 15 rolls, each of which stands on end and is supported by a rod passing through it. When a piece of material is to be cut the rack is revolved on its base until the selected roll is next to the cutting device, which is a part of the frame that holds the revolving portion upright. The free end of the cloth is fastened to a shaft and by turning a crank it is wound onto the shaft, together with a ribbon of paper. The latter is marked off in feet and inches and shows how much material has been unrolled. When the proper amount has been unwound, a knife, which moves along a guide, may be employed to cut off the material without removing the roll from its holder. Another feature of the rack is that it needs little floor space.

TRANSATLANTIC PIPE LINE PROPOSED

An Irish manufacturer has prepared in detail a plan for laying an 18-in. submarine pipe line between the British Isles and America, which, according to estimates, would transmit oil to England at a small fraction of the present transportation cost. As proposed, the pipe would be made of steel ribbon on the helical-tube principle, so as to be flexible. The overlappings of the ribbon as it winds round and round itself would be packed with asbestos twine. The tube would be able to withstand an internal pressure of 2,000 lb. and an external pressure of 10,000 lb. per square inch. Around it would be woven a cotton casing coated with preservative. To give the pipe longitudinal strength a stranded steel cable would be put inside. Twenty vessels would be employed to lay the pipe, each being assigned to a 130-mile section. The scheme calls for an outlay of $50,000,000. It is estimated that the transportation cost per 1,000 gal. per 1,000 miles would be about 50 cents. By tank steamers it is about $50.

IMPROVED DOOR HINGE SAVES FINGERS

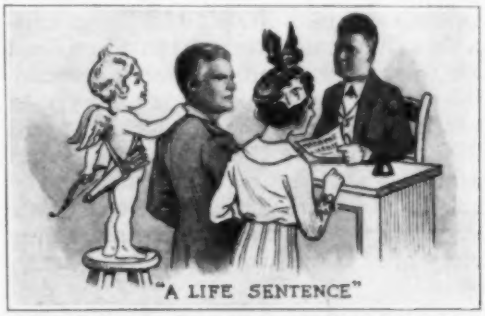
By the construction and arrangement of a door and jamb made possible with a hinge recently patented by a resident of Fort Worth, Tex., there is no crack or vertical opening left to catch and pinch the fingers of children or careless adults. The edge of the door is rounded to fit a corresponding jamb. The hinge proper is formed of metal plates having broad flat bodies or shanks, double side flanges with



screw holes, and flat circular heads which overlap and are pivoted together by a rivet. When secured in place in kerfs cut in door and jamb, three of the hinges support the door firmly, and it may be easily detached if required.

PHOTOS OF FRIENDS ADDED TO COMIC POST CARDS

Comic post cards on which have been pasted tiny photographs of the sender, or his friends, are a novelty which has been introduced among the winter residents and the tourists of Jacksonville, Fla., and elsewhere. In preparing these cards the so-called "penny" photographs are used, which are about the size of postage stamps. The background of each photograph is cut away, leaving only the head and shoulders. This is pasted on the face of the figure on the card. The adding of familiar faces to all sorts of bodies



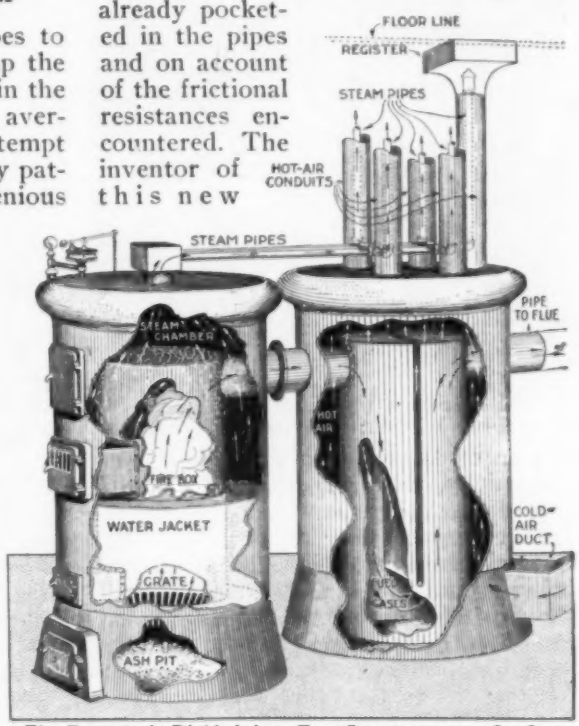
Reproduction of a Comic Post Card Which has been Altered by Covering the Faces of the Two Men with Photographs of Friends of the Sender

produces the most laughable effects and by the exercise of ingenuity in posing for the pictures and in the selection of the cards a most amusing variety of caricatures can be obtained.

FURNACE COMBINES VIRTUES OF HOT AIR AND STEAM

In any furnace much heat goes to waste in the gases which pass up the chimney. Especially is this true in the coal consumers which inhabit the average householder's cellar. In an attempt to save some of this heat, a newly patented invention resorts to ingenious expedients.

The usual fire box is jacketed with a boilerlike vessel in which steam is generated. The waste gases from the boiler, instead of passing directly to the stack, are first made to go through a second apparatus, which, in general external appearance, at least, much resembles the first device. But here the gases pass through a long U-shaped tube, the large radiating surface of which permits much heat from the gases to be saved. This heat is conducted away to the various rooms of the house by galvanized-iron tubes in the usual manner. These, however, are only 4 in. in diameter, and hot air will not ordinarily ascend such small pipes, because of the cold air already pocketed in the pipes and on account of the frictional resistances encountered. The inventor of this new



The Furnace is Divided into Two Compartments: In One Steam is Generated, from the Other Hot Air Rises to the Upper Rooms of the House

heating system, however, claims to have overcome this objection by running a ¾-in. iron pipe down the center of each air tube, the pipe having a suitable valve at its outer end to allow dead air to get out ahead of incoming steam. The steam in the small pipe comes from the boiler part of the arrangement and is for heating up the larger tubes, thus starting a current of hot air up the tubes. Both the virtues of hot-air heating systems and those of the steam variety are claimed for this arrangement.

AN ELECTRICALLY LIGHTED STOOL FOR SHOE STORES

A stool which in general appearance resembles those used by clerks in wait-

Shoe-Fitting Stool Equipped with an Electric Light in the Foot Rest, Which Affords a Customer a Good View of the Shoe being Tried On

ing on customers in a shoe store, has been fitted with an electric light, so placed that the person trying on a shoe can get a good view of it without rising from his seat. The bulb is placed behind a window in the inclined end of the steel that serves as a foot rest. It is lighted by pressing the foot against a plate adjoining the lower edge of the window. The batteries which supply the light with current are concealed in the stool.

MANY LITTLE-KNOWN USES FOR FOREST PRODUCTS

There is a far greater variety of uses for wood products than the public realizes and at the present time the discovery of new and interesting applications is progressing rapidly, through the efforts of investigators, many of whom are employed by our government. Powder for munitions or blasting, disinfectants for protection against disease, and artificial silk for clothing, are among the products obtained from wood in whole or in part. The acetone used as a solvent in making nitrocellulose powders is derived from acetic acid, a product of hardwood distillation. Black walnut is so much in demand for gunstocks that other woods, especially birch, are being substituted. It is stated on good authority that in Europe there is a shortage of willow for making wooden legs. The Forest Products Laboratory at Madison, Wis., has conducted extensive experiments in the production of grain, or ethyl, alcohol from wood and has had some success in raising the yield and lowering the cost of production. If this process can be put on a commercial basis it will make available for profitable use millions of tons of sawdust now wasted.

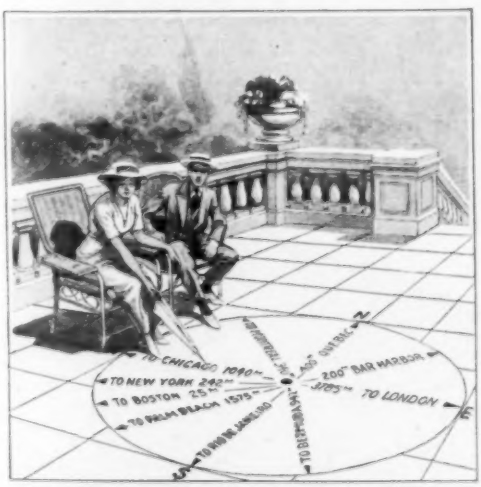
COLOR SCHEME PREVENTS PIPES BEING CONFUSED

Because no less than 21 different kinds of liquids and gases are piped to various parts of the new building of the Massachusetts Institute of Technology, it has been found necessary to work out a color system for marking the pipes to indicate their contents. Without such a scheme it would be very possible for a person to tap an ammonia pipe, for example, when he intended to tap a water pipe. Altogether there are more than 50 miles of piping in the great building. In the big mechanical-engineering laboratory the various tubes are painted their entire length in the adopted color for each kind. Elsewhere the prevailing

color is white, with little patches of distinguishing color at intervals. Pipes for water from the Charles River are painted emerald green; for the Cambridge domestic water supply, light blue, and for the filtered drinking water, light yellow. Other colors used are drab for compressed-air pipes; black or white for high-pressure steam pipes with another color at the joints; ultramarine for brine pipes, and light green for the sulphureted-hydrogen pipes.

DISTANCE TO MANY POINTS TOLD BY ODD HOTEL DIAL

A well-known hotel in Marblehead, Mass., has a large brass dial set in the floor of one of its verandas, on which are indicated the points of the compass and also the directions in which several important cities lie and their distance away. It shows, for example, that Montreal lies to the northwest approximately 340 miles away, that London is almost due east, 3,785 miles distant, and that 942 miles to the southeast is Bermuda. This unusual decoration in



Brass Dial Set in the Floor of a Veranda of an Eastern Hotel, Showing the Points of the Compass, the Distance to Several Important Cities, and the Direction in Which They Lie

the floor of the veranda is a source of much interest to the guests of the hotel, who come from many quarters of the globe.

PLIABLE ELECTRIC PAD HAS HEAT CONTROLLER

Pliability and durability are two of several important features of an electrically heated pad which is now on

Pliable Electric Pad Having a Regulator in the Cord Which can be Set for High, Medium, or Low Temperature. Three Heating Units are Shown in Insert. The One at the Left Has Asbestos and Metal Protection Removed

the market. It can be folded, rolled, and even crumpled up without putting it out of order. This article, which is intended as a superior substitute for a hot-water bottle, is made of a number of flexibly joined heating units inclosed in a flannel cover. These units consist of small squares of mica, about each of which a single strand of fine resistance wire is wound several times and attached to a large woven-wire band which joins the units. Each mica square is covered with asbestos and then with a band of metal to prevent short-circuiting or setting the pad afire. In the corner of the cover is a thermostat which prevents the heat from becoming excessive. Inserted in the electric cord is a controller which can be set for high, medium, or low temperature.

¶Government experimenters have recently produced a strong wrapping twine by twisting strips of paper into a cord. Its strength depends on the quality of the paper and the process of treatment. As yet means has not been found of protecting the paper cord against moisture.

INTERESTING PICTURES OF CHILDREN

This Is Miss Becky Lanier, Aged 10, Who Is a Fine Horseback Rider. In Many Horse Shows, Including the Recent One in New York, She has Won Honors. When Her Horse Jumps the Hurdles She Knows Just How to Hang On

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The Little Lad Above Is a Six-Year-Old Prince of India. Plots in His Father's House have Made It Wise for Him to Come to Canada, under the Care of the British Government, and Go to School. And This Is His Full Name: Narasingrae Scindia Maharrata!

The Children Shown at the Left are Attending School on a Train. The Outside of Their "Schoolhouse" is Shown Below at the End of the Work Train. The Fathers of These Pupils Work on the Railroad Track, and as They are Transferred from Place to Place the Children Go with Them—but They Never Miss a Day of School

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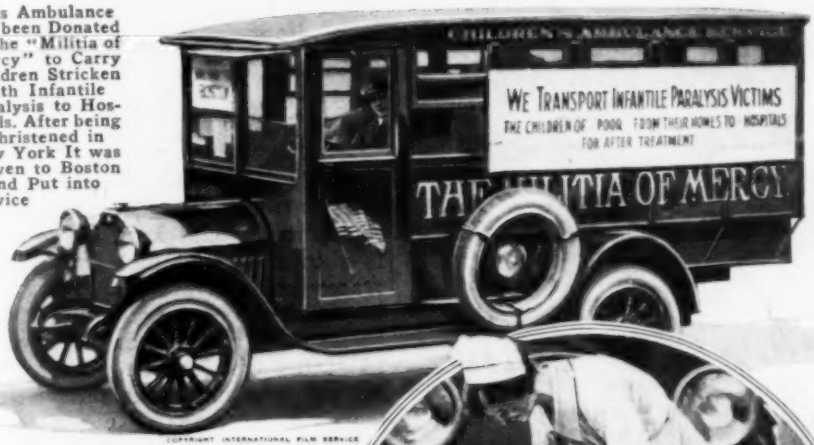
This Ambulance has been Donated by the "Militia of Mercy" to Carry Children Stricken with Infantile Paralysis to Hospitals. After being Christened in New York It was Driven to Boston and Put into Service


WE TRANSPORT INFANTILE PARALYSIS VICTIMS
THE CHILDREN OF POOR FROM THEIR HOMES TO HOSPITALS
FOR AFTER TREATMENT
THE MILITIA OF MERCY

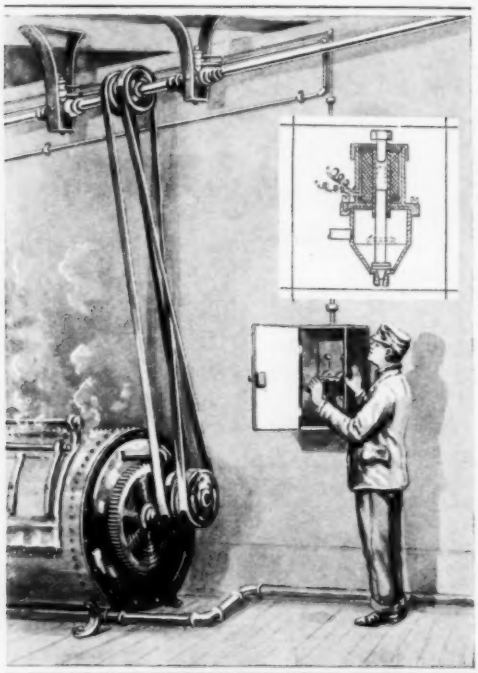
Here Is a Picture of Baby Ellen Anderson, Herself an Infantile-Paralysis Cripple, in New York City, Christening with a Bottle of Milk the Ambulance Shown Above

It is Said That in a Village North of Saloniki, Greece, There Is Just One Turk Left, and He a Little Boy. Here Is a Picture of Him, Fez, Baggy Trousers, and All

The Little Fellow at the Right Is Probably the Youngest Person in America to Ride in an Airship. Billy Thomasson Is His Name and He Is Only 20 Months Old. He was All Bundled Up Like an Airman, Even to Goggles, and Then Johnny Green, Starting at St. Petersburg, Florida, Took Him for a Ride in the Sky

ELECTRICALLY OPERATED OILER PROMOTES SAFETY

An electrically operated oiler has been patented which makes unnecessary the often dangerous practice of



An Oiler which is Opened and Closed by Means of an Electric Switch: It Makes Unnecessary the Often Dangerous Practice of Oiling Running Machinery by Hand

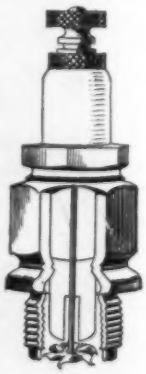
oiling machinery by hand while it is running. Where this invention is used oil is fed from a central tank into as many oil cups as are needed. Each cup is connected with an electric circuit and has a valve that is closed by a small plunger. The circuit is operated by a switch within easy reach of the person in charge of the machine. By closing the switch a small magnet just above each oil cup is energized. This instantly draws up the plunger and so the oil is allowed to flow down into the bearings. As soon as the current is turned off, the plunger drops down again and the oil stops flowing. If desired, the switch can be operated by clockwork. While the installing of this device on machinery would involve extra expense, it is not thought that the additional outlay would be considered excessive, particularly for types of machinery on which safety devices are of prime importance.

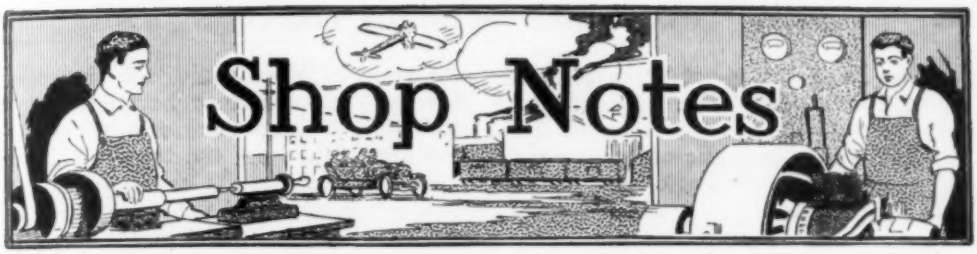
TEN STATES HAVE NO LAWS ABOUT FITTING GLASSES

That the fitting of glasses for the eyes is today regarded as a profession requiring special knowledge and skill is shown by the fact that all but 10 states in the Union have laws requiring all persons engaged in this work to be duly registered. In two of the 10 states which have no laws on this subject, the matter is now before the state legislatures. These commonwealths are Ohio and Pennsylvania. The eight remaining states are: Wyoming, Texas, Louisiana, Mississippi, Alabama, South Carolina, Kentucky, and Missouri. While the optometry laws of the country are far from uniform, there is apparent a tendency to elevate the standards of the optometrist's profession and in some states all applicants for certificates are subjected to examinations that are quite rigid.

TURBINE FAN A FEATURE OF NEW SPARK PLUG

A spark plug which is constructed along decidedly new lines is equipped with a turbine fan loosely mounted on a rod that extends down through the center of the plug. The compression and explosion of the engine cause the fan to rotate rapidly. From the extremity of each fan blade hot sparks are delivered to the bushing. This arrangement not only provides a larger spark area, but is also designed to insure ignition. It is to a large extent self-cleaning, as the fan automatically throws off soot and oil deposits. All the parts are substantially built.



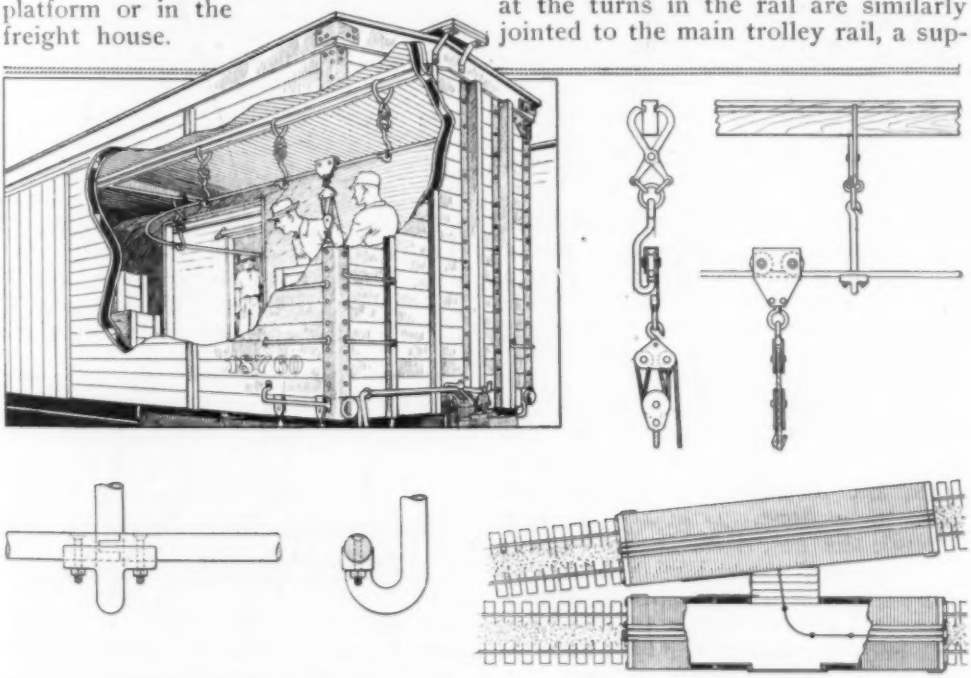


Portable Trolley and Tackle for Freight Transfer

By JOHN W. SHANK

RAPID and economical loading and unloading of merchandise freight between platforms and railroad cars was accomplished by fitting a portable trolley and tackle into the cars and above the adjoining platform, as shown in the sketch. Heavy packages and crates of goods ordinarily requiring the use of a truck are handled in this way with ease. A sling, or grabhook, is fixed around the load, which is raised from the floor by means of the multiple-pulley block and rope. The rope is locked and the load transported to its immediate destination on the loading platform or in the freight house.

The trolley is supported by means of tongs set into grooves cut in the ridge pole of the car roof, as shown in the detail sketch at the right. The hooks which support the trolley are of forged steel, curved as shown, to fit the trolley wire or rail, and to give clearance for the passage of the hanger. The trolley rail is built up of sections of round iron rod, jointed with a tongue and groove at each joint, and bolted to the hooks with flat-head bolts, as shown in the detail sketch at the left. The rigging may thus be "knocked down" for convenient removal. The curved sections at the turns in the rail are similarly jointed to the main trolley rail, a sup-

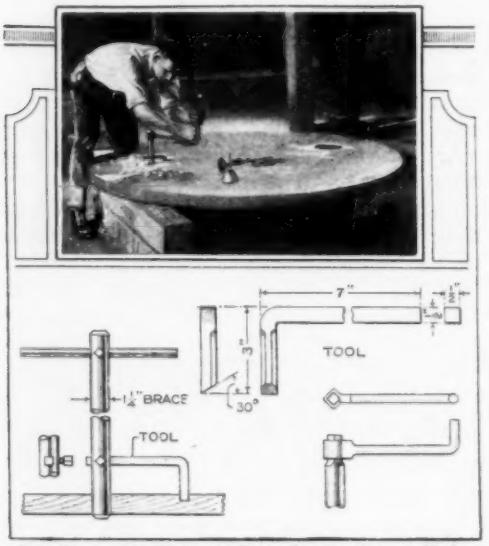


This Portable Rigging for the Handling of Package Freight Saves Time and Physical Energy of the Workmen

porting hook being set at each joint, about 4 ft. apart. The upper sketch shows the device in use in a freight car, and below is shown the use of the rigging between two freight cars, on adjoining tracks.

Tool for Boring Large Holes in Wood

It is sometimes necessary to cut large round holes through heavy flooring, wooden partitions, or wooden



This Tool was Made to Bore Large Round Holes in a Tank Cover, and Has Many Uses

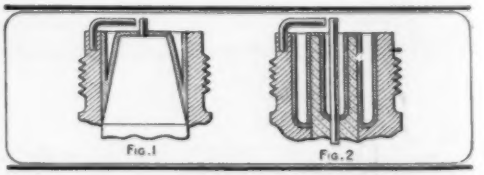
tank covers. With a saw it is difficult to cut a smooth circular hole, and a more accurate tool is required. Such a tool, designed to cut holes 5 to 12 in. in diameter, is shown in the illustration, and is made as follows: Heat a bar of tool steel, ½ by ½ by 10 in., to a cherry red; bend it at a right angle, 3 in. from one end, and temper it. The brace is made from 1¼-in. round bar stock, and its length should suit the work to be done. Drill a ½-in. hole through the bar, 4 in. from one end, squaring it afterward with a file, so that the tool may pass through with a snug fit. Perpendicular to this hole, drill and tap a hole for a ⅜-in. setscrew. At the other end of the brace, drill a ½-in. hole, and fit a round-bar handle through it.

To cut a 10-in. hole, for instance, through a wooden floor, bore out a 1¼-in. hole in the exact center of the circle laid out. Then set the tool so that it will be 5 in. from the extreme cutting edge to the center of the brace, and cut out the disk in the center. In the photograph reproduced, holes are being bored in a hard-maple cover, 3 in. thick, for a large tank. As these holes had to be accurate within a small fraction of an inch, they could not be sawed out, and the above described tool was designed and used with excellent results.—K. M. Coggeshall, Webster Groves, Mo.

Kinks in the Care of Spark Plugs

The failure of a spark plug is one of the most frequent troubles with the automobile engine, hence the autoist should know what to do when this occurs. When the spark plug misses, or fails to fire, the engine is out of tune or balance. This condition is instantly noticed by the irregular vibration set up in the car, and by the loss of power. Generally the trouble is caused by the plug becoming short-circuited through the collection of carbon on the porcelain of the plug. This is termed sooted or dirty, and is caused by several conditions. The carburetor may be out of adjustment, giving too rich a mixture, or there may be too much oil in the cylinder. These possible causes should be looked into if the trouble is chronic.

If the plug is found to have a black



Typical Sections of Spark Plugs, Showing How Carbon Collects on Surface, Causing a Short Circuit

coating clean it thoroughly so that the porcelain is white, and the points quite clean. It will make cleaning easier if the plug is soaked in wood alcohol. Then take a sharp-pointed tool, a knife

answering very well, wrap a piece of rag around it, and scrape the plug all over, getting down into the recesses.

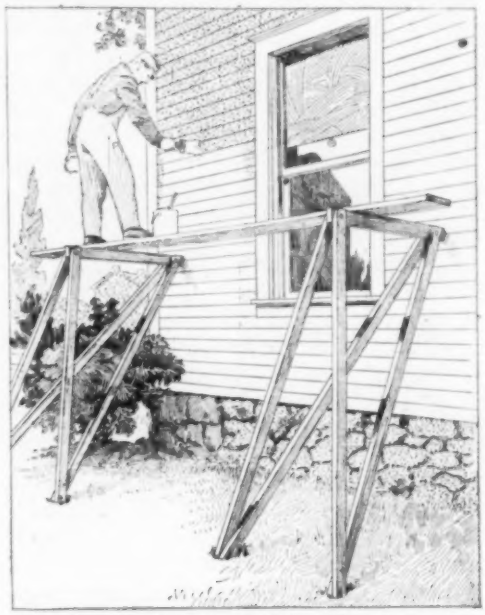
There are various types of plugs, the most common being the porcelain, shown in Fig. 1. The inclosed type of plug will fire longer without the need of cleaning, but it is hard to clean, as it has to be taken apart. When a plug is taken apart, great care must be taken to see that the porcelain is not broken, and when reassembling it, all the joints must be made gas-tight. Fig. 2 shows another type of plug, the possibility of short-circuiting by carbon deposit being indicated.

The modern plug is so made that it will not come apart, and, while it is a little harder to clean the individual parts when they cannot be handled separately, it is not so much trouble in the long run, as it is hard to put the other type together again properly. The insulator of a plug sometimes cracks, and even though it be but a minute crack, it must be thrown away, as the carbon seeps in quickly, and the plug will not fire.

When buying new plugs be sure to get the type that is made for the particular engine to be fitted. In addition to the numerous special plugs, there are two sizes of hexagons in use, one ⅞ in. across flats, and the other 1⅛ in. across. It is annoying to find that the spark-plug wrench will not fit the new plug intended for use, especially so when one cannot get at the plug to turn it with an adjustable wrench. It is a good plan for the autoist to carry an extra set of spark plugs, so that in case of failure on the road the bad one may be replaced without the necessity of cleaning plugs until the return to the garage is made.

Movable Scaffold for Building and Painting

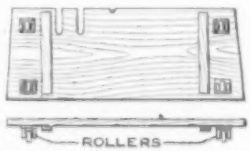
The supports for a scaffold shown in the illustration will be found more convenient in many cases than the use of a ladder, or of brackets fastened to the side of a building, to provide a support for workmen. They are made of 2 by 4-in. stuff, and should be arranged so that the lower ends are slanted away from the building sufficiently to prevent their slipping, and if desired, for use on smooth footings, braces which can be spiked down may be fastened to the lower ends of the supports.—James R. Townsend, Itasca, Tex.



These Supports for a Scaffold Are More Convenient than the Use of a Ladder, Especially for Work at a Comparatively Low Height

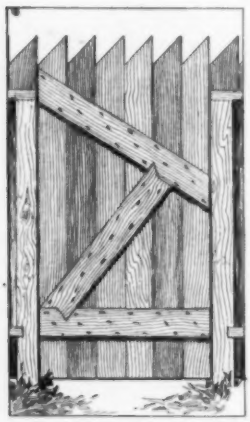
Casters on Footboard for Use in Auto Repairs

One of the footboards in an automobile may be converted into a convenient device for use in repairing or examining the under parts of the machine. The board is fitted with four casters, as shown in the sketch, and these enable the workman to rest on the board and shift easily under the car. The device is always available, as it is fitted into its place in the floor of the car when not in use otherwise.—Louis S. Niper, Beach Park, Conn.



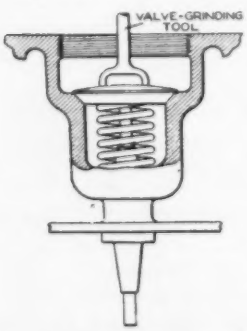
A Nonsagging Board Gate

The usual method of bracing a gate built up of boards is to fasten horizontal cleats across it, one near the top and another near the bottom, and a third diagonally between them, forming a Z-shape. This is often unsatisfactory in that the gate sags easily by strain in use, as well as from its own weight. A better method of disposing the braces is shown in the sketch. This was tried out with success, the gate withstanding unusual strain. The lower brace is placed horizontally across the boards and well nailed. The upper brace extends diagonally downward and is notched into an intermediate brace, which in turn is notched into the lower one. The hinges are fastened to the edge, at the left of the sketch.—C. F. J. Charliss, Houston, Tex.



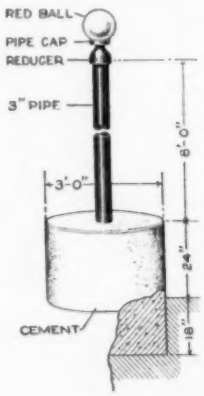
Spring Aids in Valve Grinding

In grinding gas-engine valves, it is imperative that the stems be lifted frequently from the seating in the cylinder to insure an even distribution of the abrasive material. If the valve is not lifted from time to time, the emery or carborundum dust and oil are apt to form in small pellets, producing deep grooves in the valve head and seat, which are hard to remove by grinding. The usual method is to lift the valve stem with one hand, while oscillating it with the other. A coil spring of moderate tension, placed under the valve head, as shown in the sketch, will lift it automatically whenever the pressure is released from the grinding tool. Only enough pressure to keep the valve head seated, against the resistance of the spring, should be applied.—Victor W. Pagé, Bristol, Connecticut.



Inexpensive Traffic-Light Post

A traffic-light post that is practical and inexpensive is shown in the sketch. It is set in a concrete base providing the "isle of safety" and a 10-in. red-glass light globe is supported on an 8-ft. section of 3-in. iron pipe. The connections are made with standard reducers, and the globe is fitted into a 4-in. pipe cap. The wiring is conducted to the globe through a conduit connecting with the post. The pipe cap which holds the globe is drilled and tapped for small machine screws, which hold the globe in place.—H. G. McQueen, Dow City, Ia.



Skidding a Heavy Boiler or Machine

The moving of a heavy boiler or a large machine without the use of special appliances is sometimes a difficult task. A good way to handle this job is to build a wooden cradle around the object to be moved and mount this on two heavy wooden runners, resting on a well-greased plank. A few other greased planks should be in readiness so that when a couple of teams are hooked to the cradle and it starts to move, the planks can be laid as required just in advance of the runners. The planks may be used repeatedly.—James Skelton, Toronto, Can.

A Sanding Drum for the Wood Shop

by Charles A. King

A WIDE range of woodwork to be smoothed may be handled to advantage on a sanding drum like that shown in the illustration. It is of simple construction and can be made easily even in a small woodworking shop, the only special fittings required being the shaft, flanges, bearings, and collars. These are readily available from machinery-supply houses, or may be obtained from old machine parts. This machine was used in a job shop for the sanding of ordinary building trim, elaborate bank fittings, and even for high-grade furniture. Flat work, curved pieces of a radius larger than that of the drum, and the edges of stock may be sanded on it, by the use of the table or the edge-sanding rest. The drum revolves in the direction indicated by the arrow at a speed of 600 revolutions per minute. It is driven by a 3-in. belt over a 10-in. pulley, set on the shaft, and an idle pulley provides for shutting off the machine temporarily.

The single table above gives greater freedom of use, and was determined upon after two tables had been tried. Care must, of course, be exercised in sanding work so that the operator may not be endangered by the drum. It is desirable, also, to provide a drive that will leave the top of the drum and the table free from obstructions, and permit the operator convenient access in handling large pieces. The table serves merely as a rest for the stock as it passes over the drum.

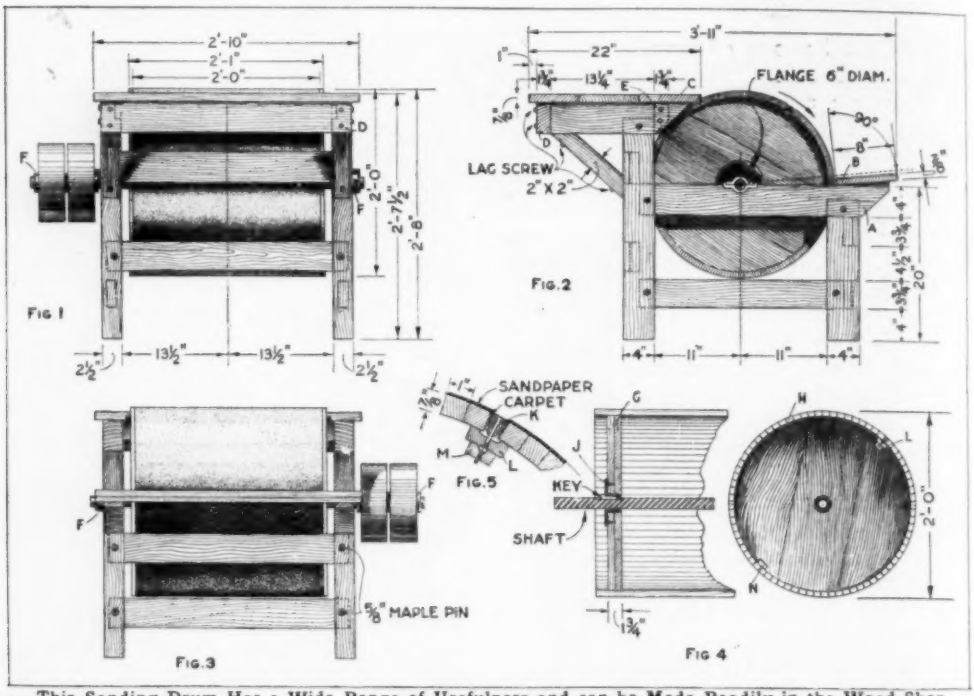
The drum is supported in a frame made of hard wood. The legs are of 2½ by 4-in. stock, braced by 2 by 4-in. pieces, mortised into them, and pinned at the joints with ⅝-in. maple pins. The members A, which carry the drum shaft, are of 2½ by 4-in. stock, and are fixed to the legs by mortise-and-tenon joints, as shown in the side view, Fig. 2. The edge-sanding shelf B extends slightly beyond the members A, as shown, and should be set carefully on wedges, so that the center of a ⅞-in. board will extend on a line with a radius of the drum, as indicated by the dotted line at B. To insure accurate edge-sanding on stock of other thicknesses, it is necessary to build up on the shelf so that the edge will not be "out of square."

The table C is built up on a frame of 1¾ and 2½ by 4-in. stock, fastened at the joints with lag screws, as indicated in Fig. 2, at D and at E. The brace at E is shouldered into the side rails of the table, and its lower edge is beveled to accommodate the drum. The table is braced against the rear legs with 2 by 2-in. pieces, fastened with lag screws. It is 2 ft. 7½ in. from the floor, and the upper edge of the drum projects ½ in. above it.

The drum is carried on a 1 7/16-in. shaft, keyed to flanges, J, Fig. 4, which in turn are fixed to the drum ends G, with screws. The shaft rests in split bearings, set into the supporting member A. Side motion of the shaft in the bearings is prevented by collars between the flanges and bearings, and set collars, F, Fig. 1, on the ends of the shaft. The body of the drum is built up on the drumheads G, which are of two layers, cross-banded to insure great strength, necessary at the considerable speed of operation. The sanding surface is built up of small strips, H, cut so that their edges are in line with radii of the drum end. The pieces of the drumhead must be fastened together firmly with screws or

bolts, riveted so that the nuts cannot become loosened accidentally. Cut the drumheads out approximately to

The sandpaper is drawn taut and clamped in place by means of the clamping strip K, shown in Fig. 5. The



This Sanding Drum Has a Wide Range of Usefulness and can be Made Readily in the Wood Shop at Small Outlay

their finished size. Cut the keyways in the bearings of the flanges and mount the flanges upon the drumheads. Then turn the heads down carefully to their exact finished diameter, which is 1 ft. 10¼ in., if the staves of the drum are made ⅞ by 1 in. To do this, set them on the shaft together at one end, keying them, and apply the power by means of the pulley and belt. End motion of the shaft is prevented by the use of the set collars F, which are brought up against the bearings. Place the ends in position and nail the staves in place, setting the heads of the nails carefully, or countersink the screws, if this form of fastening is used. The staves should be of pine or whitewood, fitted tightly, and glued in place as they are fastened.

The sanding surface of the drum is covered with a layer of Brussels carpet, and the sandpaper is placed over this, the carpet providing a cushion. strip is fitted into a groove so that, when the carpet and sandpaper layers are in place, the upper surface of the strip is just below the surface of the drum, never above it. The strip should be tapered only very slightly, if at all, the sides of the groove being parallel with those of the strip. The lower edge is rounded to prevent tearing the sandpaper. The strip is held in place by flat-head bolts screwed into nuts set in a strip M, fixed to the inner side of the drum. The bolts can thus be released from the outside by means of a screwdriver. They are held snugly in the strip L, being only loose enough to be turned without difficulty.

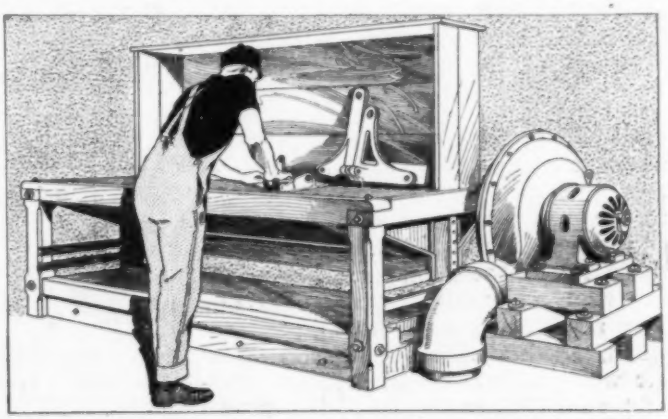
The clamping device must be counterbalanced by a strip on the opposite side of the drum, as at N, Fig. 4. The clamping device as well as this strip must, of course, be fastened in place before all of the staves are glued finally. They may be fastened tempo-

rarily with screws, and glued in place when the balance strip and clamping strip are in position. The clamping strip and its bolts should then be removed and a strip of the same thickness as those used for the drum should be fixed into place in the groove. The surface of the drum must next be turned smooth, using the machine as a lathe, and removing only as much stock as is necessary. The strip in the groove prevents the breaking of the edges at that point. The surfacing of the drum must be done with great care, for if it is not straight and true, the sandpaper will bubble and crack before it is worn considerably. The ends of the staves should be trimmed off to the proper length by turning. The drum should be in perfect balance to insure good results, and, if necessary, holes may be bored in the heavy side of the drumheads, or weights fastened securely to the lighter side, to correct fault on this score.

The carpet backing for the sandpaper is stretched over the drum and nailed into the clamping groove. The sandpaper is stretched over it, sufficient length being allowed to permit the sandpaper to pass under the clamping strip and against the opposite side of the groove. Slots are cut in the sandpaper to accommodate the bolts in drawing them up firmly. The first sheet of sandpaper should be fitted carefully, and others may be patterned from it. It is desirable to stretch the sandpaper over the drum on a damp day, as it will contract with dry weather, giving a better sanding surface. The paper should never be moistened in applying it, as this ruins it for use in sanding. For ordinary work No. 2 sandpaper is used, and for smoother finishes finer grades may be applied. The machine may be given an oil finish or painted a suitable color. A convenient method of fixing it to the floor is by the use of angle irons.

Exhaust Fan for Workbench Aids in Removing Dust

Before painting iron castings, or secondhand machinery, it is necessary to remove the rust and foreign substances from the surface. During the cleaning process, the detached rust particles, floating about in the air, are inhaled by the workman, lodge in his eyes, and settle on his clothing. This metallic dust is also injurious to the bearings of machinery which may be near by, to say nothing of its settling on finished or wet painted surfaces. A simple suction device was fitted to a workbench, as shown in the sketch, to eliminate these bad features.



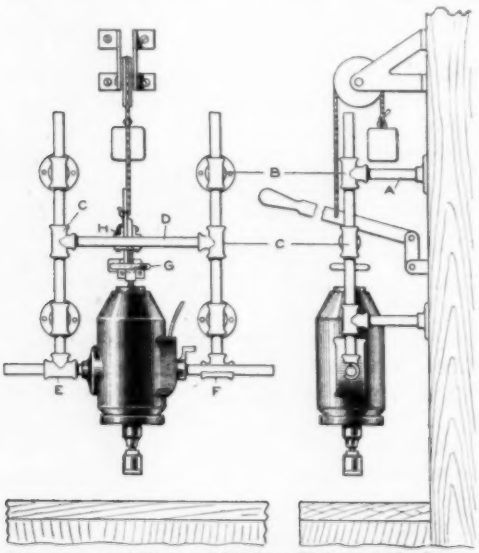
Dust from Cleaning of Castings is Drawn Away through the Grating in the Top of the Bench, Thus Protecting the Workman

The workbench was constructed with an iron grating for the working surface, instead of the usual board top. An air-tight, boxlike inclosure was then built below the grating, with the bottom sloping downward. At one side an exhaust fan, driven by an electric motor, was set, and the inlet side connected with the bench inclosure. The exhaust from the fan was piped outside

the building. With the fan in operation, castings are placed on the grating and brushed or sandpapered without inconvenience to the workman. The dust and rust particles are drawn downward through the grating. Such a bench is suitable for use in the removal of old coats of paint, to clean up machinery parts, or even to finish the surface of woodwork. If chipping or grinding is done, it will be necessary to put up a back stop, as shown, to keep small particles from flying across the room and injuring other workmen.

Portable Electric Drill Used as Drill Press

Many shops are provided with a portable electric drill, which is a necessity for certain kinds of work, but not



This Frame of Pipe and Fittings Enlarged the Range of Usefulness of a Portable Electric Drill Needed Only Occasionally

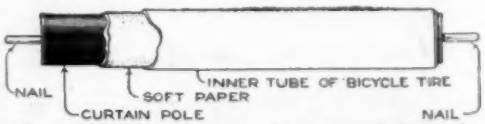
used often. The frame shown in the illustration was made to fit a drill of this type, and extended its usefulness to the many kinds of work ordinarily done on a small drill press. Most of the parts of the support and mechanism were made from pipe and fittings. The machine is fixed to a frame of wood, which supports a table on which the work is rested. The wooden support may be arranged so that it can be moved without taking the drill and fittings from it. The drill is supported in a frame which is raised and lowered by means of a lever, fixed to a counterweight.

Four standards, A, made of a section of 1-in. pipe, a flange, and a tee are fixed to the wooden frame. The frame of pipes and fittings which carries the drill is made of pipe of an outside diameter to slide closely in the tees, B, of the standards. Tees, C, are fixed solidly to the center brace D, and the sections of pipe joined to them. The shaft of the drill is rested in a tee, E, and in the tee F, which is cut open so that the shaft may be removed readily. The drill is held securely between the brace D and its bearings by means of the handwheel G, operating on a threaded rod set into a lug on the lower side of the brace.

The handle and its fittings are made of strap iron. The range of the drill is limited by the movement of the handle, which is fitted to the brace D by means of a shoe, H, in which it slides. The counterweight cord is fixed to the handle and passes over a pulley set in a bracket above the pipe frame.—W. A. Ready, Boston, Mass.

Substitute for a Small Printing-Press Roller

The roller on my printing press became so marred that it could not be used with satisfaction, so I made one which was quite efficient. It can be



The Rubber Covering may be Removed Easily for Cleaning and Renewed Cheaply When Worn

cleaned easily and was made of materials which are easily obtained. I sawed a piece of curtain rod to the proper length and drove a nail into each end as a bearing, cutting off the

head. Several layers of soft paper were pasted around the roller, as shown in the sketch, and the inner tube of a bicycle tire was then fitted over the roller. The rubber tube can be removed quickly and cleaned, or renewed if desired. Hand rollers may also be made in this way by fitting a handle on the nails at the ends of the roller.—P. F. Harper, Danville, Va.

Soldering Patches on Tanks or Large Objects

The soldering of patches on tanks and other objects that cannot be taken to the workshop readily is often difficult. The following method overcomes most of the objectionable features: First shape a patch by pressing a piece of tin somewhat larger than the opening, with the ball of a hammer, leaving a small flange around the edge. Tin both the patch and the part to be soldered; fill the hollow in the patch with melted solder and permit it to cool. Then using a pad, or heavy glove, place the patch in the hand, melt the solder with the soldering copper and apply the patch. Sweat it into place in the usual manner.—Charles Straughan, Sprague, Wash.

Automobile Gear-Box Repair

Trouble was experienced on the gear box of an automobile in that the grease leaked, as shown in Fig. 1. The boss at the left, as indicated in Fig. 2, was tapped, and a brass plug was inserted to cover the end of the shaft. This necessitated shifting the locking screw, as shown in Fig. 2. The tapped hole formerly necessary for the locking screw was plugged. A leather washer was fitted at the end plug to insure a tight joint.

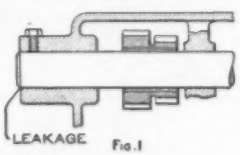


Fig. 1

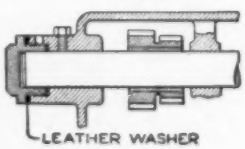


Fig. 2

Portable Safety Platform for Telephone Linemen

To provide utmost safety in handling telephones on private lines when carried over the same poles as are used for electric-power wires, a simple and effective portable safety platform was devised, as shown in the illustration. It is constructed of wood, about 1½ in. thick, 14 in. wide, and 18 in. long, cut out at the inside edge to suit the average standard pole for heavy line service, and insulated with rubber or other suitable material. Two straps are attached to the platform at the inner side to reach around the pole, and are provided with a strong buckle for ready and substantial fastening. A spike driven into the pole serves to keep this support in place. At the outside edge, two heavy leather straps are also provided to carry the weight of the operator on the platform.

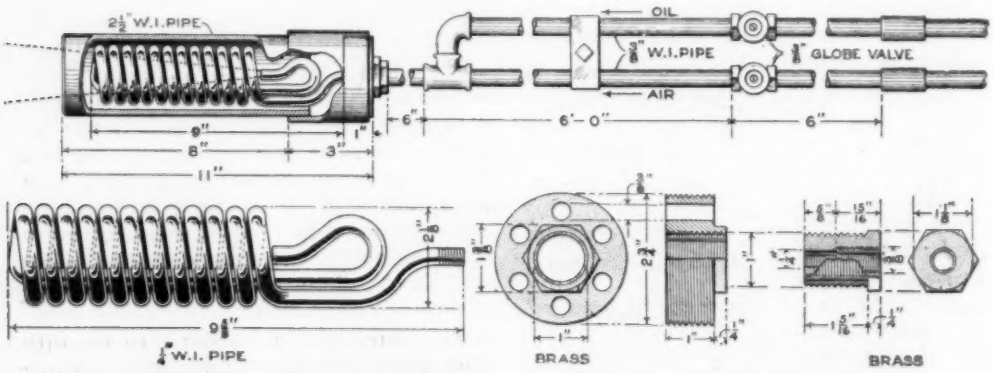
The platform is ordinarily used about 2 ft. above the grade, to suit the regulation height of the telephone attached to the pole by means of a strap at a point about 9 ft. above the ground. This platform proved of great value in eliminating the constant danger of electric shock when using the private telephone lines of light and power companies, sometimes exposed to contact with high-voltage transmission lines.—L. R. W. Allison, Newark, N. J.

¶Caliper a bored hole at several points in its length, as the size at the opening may be misleading.

Oil-Burning Blowtorch for Sheet-Metal Work

The torch shown in the illustration was designed for use in railroad shops on boiler, tank, freight-car, and other heavy sheet-metal work. By means of it a powerful flame may be directed on a limited area. The device is simple in construction, convenient in operation, and comparatively light. The oil fuel is admitted through the upper pipe, at the right, and the air for the blast through the lower pipe, the flow being controlled by ⅜-in. globe valves. The pipes are braced near the torch and form a strong grip for the operator. The torch proper is a coil of ¼-in. wrought-iron pipe, fixed into a brass collar, having holes through it, as shown in the detail sketch, and covered with a 2½-in. wrought-iron pipe, from which the flame is projected.

The upper sketch shows the general-assembly drawing of the torch; the details are shown in the lower sketches. The cover for the coil is 11 in. long over all. One end of it is fitted with a brass plug, shown in detail at the center, below. Inside of this plug is a second brass plug, shown at the right, and into this are fixed the supply tube and the coiled pipe. The dotted lines in the upper view show how the flame is forced from the end of the coil, which is also shown in detail. It is 9⅝ in. long and 2⅛ in. diameter. The oil is heated to the proper temperature for ignition in passing through the coil, and the flame passes out through the center of it.



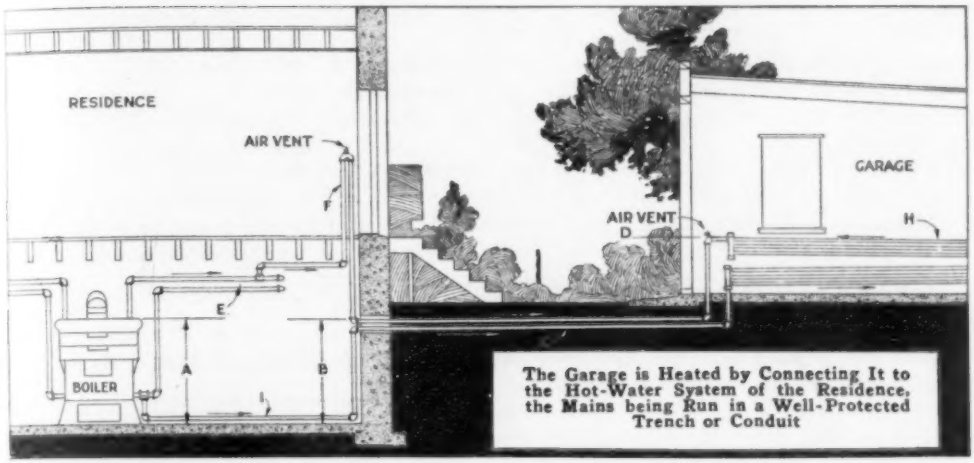
This Torch Produces a Powerful Flame and Is Useful on Heavy Sheet-Metal and Boiler Work

Cutting Threads without Tap or Die

Requiring a thread on a small piece of copper wire and a nut to fit it, I found that no tap or die was available. A piece of spring brass was drilled to a size slightly smaller than the wire, and a small rat-tail file was forced into it by gradual turns and then withdrawn with a rotary motion, forming threads. This nut was turned onto the tapered end of the wire, and being slightly harder than the copper in the wire, cut a satisfactory thread.—Thomas A. Hancock, Los Angeles, Calif.

Preserving Stove Linings

The fire-brick lining of a stove will last much longer and give better service if promptly jointed with fire clay. When the new fire bricks are placed in the stove, set them with the clay, which is mixed to a mortar with water. Burn a few sticks of wood, taking care not to heat the stove too rapidly, and the clay will soon harden. The lining usually begins to deteriorate at the joints, and by filling them with fire clay, the latter may be removed and a new layer inserted when it has pitted or cracked badly.—L. E. Fetter, Portsmouth, N. H.



The Garage is Heated by Connecting It to the Hot-Water System of the Residence, the Mains being Run in a Well-Protected Trench or Conduit

Heating a Garage from Residence Hot-Water System

The heating of a home garage in winter is a problem that confronts not a few motorists, and the method suggested in the sketch has been found practicable for utilizing heat from the residence heating system for this purpose. The chief difficulty encountered was that the top of the boiler in the basement was too high to permit the flow pipe to be run underground to the garage. In other instances the boiler may be situated so that a pipe extending across the cellar as required would be much in the way. These difficulties were overcome by the installation shown in the diagram.

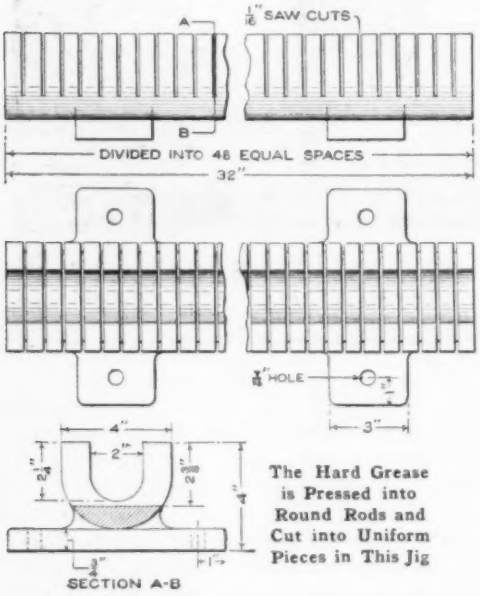
The flow main to the garage was connected to a flow main, E, in the cellar leading directly from the boiler at the top. The pipe then passes through the floor, forming the loop F, which is provided with an air vent. From this, the pipe passes down to below the grade of the ground outside and into the tile, or other suitable trench, leading to the garage. The top of the loop F must be at least 3 ft. above the intake at D, and more is desirable if convenient to provide it. The circulation to the garage depends in a large measure on the height to which the loop rises. The distance B must not be more than 18 in. less than the distance A.

Run the pipe in the trench as close to the surface as it is possible to do and still provide adequate covering and protection. The arrows indicate that the pipes grade up toward the heads of the former. The main connects with the coils in the garage, as shown, flowing into the upper coil, which is in turn connected with the lower one at the extreme end, not shown. The return main G also is laid in the trench and grades up as indicated by the arrow. It passes through the wall and into the cellar below the flow main and then drops to the floor and returns to the boiler. The return pipe I need not be below the center line of the return tapping on the boiler, unless there are doorways, or other obstructions, making it necessary to drop it to the floor as shown. It must not, however, be connected to any other return pipe at a height above the center line of the return tapping. The loop F and the coil H should be freed of air by means of the vents.

Jig for Cutting Hard Lubricating Grease

In order to cut hard grease into disk-shaped pieces, about ½ in. thick and 1⅞ in. wide, the jig shown in the sketch was devised in a railroad shop. The principle involved may be used for a variety of similar purposes with slight adaptation. The grease is

shipped in barrels and prepared for use by pressing it through a die to form it into long sticks, 1⅞ in. in diameter. These are placed in the jig



The Hard Grease is Pressed into Round Rods and Cut into Uniform Pieces in This Jig

and cut to uniform lengths, each piece weighing one ounce. The pieces of this size are used for the grease cups of locomotive driving rods. The device consists of a casting of iron provided with legs by which it is bolted down. It is 4 in. high, 8 in. wide, and 32 in. long. The guide slots are cut with a saw, cutting a kerf 1/16 in. wide. The inside of the jig is finished to make it easy to clean.—J. K. Long, Renovo, Pa.

Eliminating Pounding in Gasoline Engines

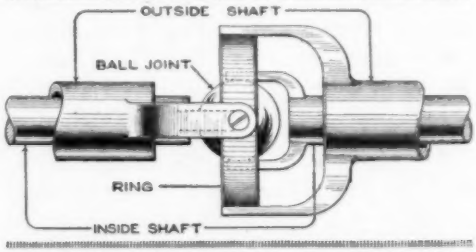
Pounding in a gasoline engine can, in almost every case, be attributed to a loose part within, particularly the various bolts. A careful examination should be made immediately, the bolts and nuts of the connecting-rod bearings, the main-shaft bearings, the bolts that connect the flywheel to the crankshaft end, and other fittings being closely inspected. A loose bolt on a flywheel rotating at great speed, is particularly dangerous, and should be remedied at once.

Safety Device for Wheelbarrow

When a wheelbarrow is pushed through a narrow passageway the hands of the laborer may be painfully injured by striking against the door jambs. To overcome this, nail a block of wood on each handle of the wheelbarrow just in front of the grip. The block should be tapered from the front end.—Victor E. Carpenter, South Bend, Ind.

Double-Shaft Universal Joint

The universal joint shown in the sketch provides for the use of one shaft within the other, permitting the two sections to be at an angle to each other while in operation. Other features are that the shafts may be run at different speeds, in the same or opposite directions, or one shaft may be run while the other is stopped. The outer shaft is a tube having a fork at the end adjoining the large ring at the universal joint. The forks are mounted on this ring with screws, as shown. The inner shaft is solid and the forks at the end are mounted on a solid steel ball, in the same relation to each other as are the larger forks, mounted on the ring. While largely an experimental device,



This Universal Joint Houses One Shaft within Another and Has Experimental Interest for Power Transmission

it has interesting possibilities for application to machinery and power transmission.—James O. Tow, Columbia, Missouri.

¶Electric fans are used for the drying of motion-picture films. The films are wound on large drums which are revolved steadily while the current from the fan is played upon them.

Garden Seats of Concrete

By EDWARD A. KRUEGER

[This article details the making of two garden seats and gives designs for four others. Information on the various materials, surface finishes, and the mixing of concrete is given in pamphlets furnished gratis by manufacturers of Portland cement.—Editor.]

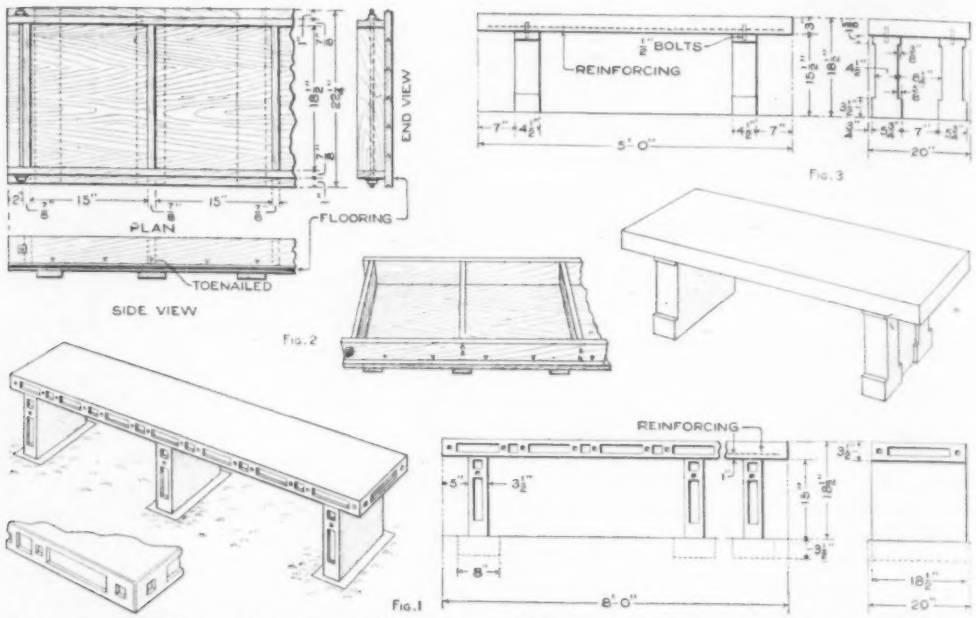
THE making of cement products is especially practicable for the home worker in that the materials required are inexpensive and easily procured; with reasonable care, excellent results may be obtained, even by a novice. The permanence of concrete, properly mixed and placed, commends it as a constructive material for many objects of use and ornament exposed to the elements.

A garden seat like that shown in Fig. 1, without the paneling on the edges, involves first the making of a plain box form for the top slab. This may be used for the making of two or more supports by nailing partitions in the form, as shown in the sketch and detail drawing, Fig. 2. A smaller form is required for the foundations, which are cast in molds separated by partitions. Make a rectangular form, having inside measurements of 18½ in. by 8 ft., and 3½ in. deep, for the top slab. Build up the platform for the form of ⅞-in. flooring, and smooth the top surface to give a good finish to the concrete. Cut the end pieces squarely, 18½ in. long, and fit them between the sidepieces. Screws, 12-penny common nails, or bolts, as shown in Fig. 2, may be used to hold the form together. Square the form and nail strips across the upper edges to prevent the weight of the concrete from forcing out the sides. Toenail it in place on the platform, clean the interior, removing nails or other obstructions, and smooth off rough parts with sandpaper. Fill any irregularities in the inner surfaces of the form with plaster of Paris, and permit it to dry. Apply one or two coats of shellac to the inside of the form, to protect it from the moisture. When the shellac is thoroughly dried, apply a uniform coat of linseed oil to the mold and the form is ready for the concrete. If many slabs are to be made with a mold, soak the wood thoroughly in crude oil before making the form.

If the form for the supports is made from new stuff, the process of construction is similar to that described. Set the partitions squarely, 15 in. apart from face to face, nailing them as shown. If the form for the top slab is used for the supports, clean it, and apply fresh coats of shellac and oil for each successive use. The weight of the top slab is usually sufficient to hold it in place. If desired, bolts may be cast into the upper edges of the supports and fitted into holes in the top slab, as shown in Fig. 3.

The top slab is reinforced with heavy wire mesh, or with ¼-in. round iron rods. The latter extend lengthwise of the slab, set on 3-in. centers, and crosswise on 10-in. centers, their ends being 1½ in. from the adjacent edges of the slab. They should be wired together to form a mat, or wired to light wire mesh. The reinforcing is placed 1 in. from the lower side of the slab, as shown in the working drawings, Fig. 1. It is important, therefore, that the upper side of the slab be marked when the form is removed, as the reinforcing is less effective if the slab is inverted.

If bolts are used in the supports, set wooden pegs of the proper size at tamping. Fill the mold, tamp the concrete, especially around the edges, and



Plain Slabs of Uniform Width, Paneled if Desired, are Used for the Seat Shown in Fig. 1. That Shown in Fig. 3 Involves the Use of Special Forms for the Shaping and Paneling of the Supports

corresponding points in the bottom of the mold.

Prepare the concrete mixture and pour the mold as follows: Mix thoroughly a batch of concrete just sufficient to fill the mold, using one part of Portland cement to three parts of coarse, clean sand, a 1:3 mixture.

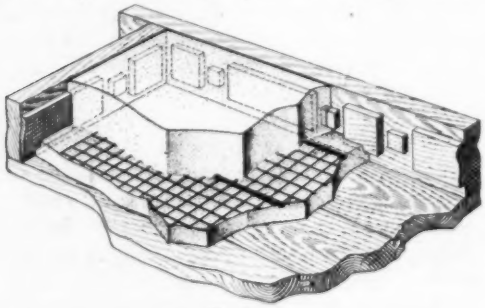
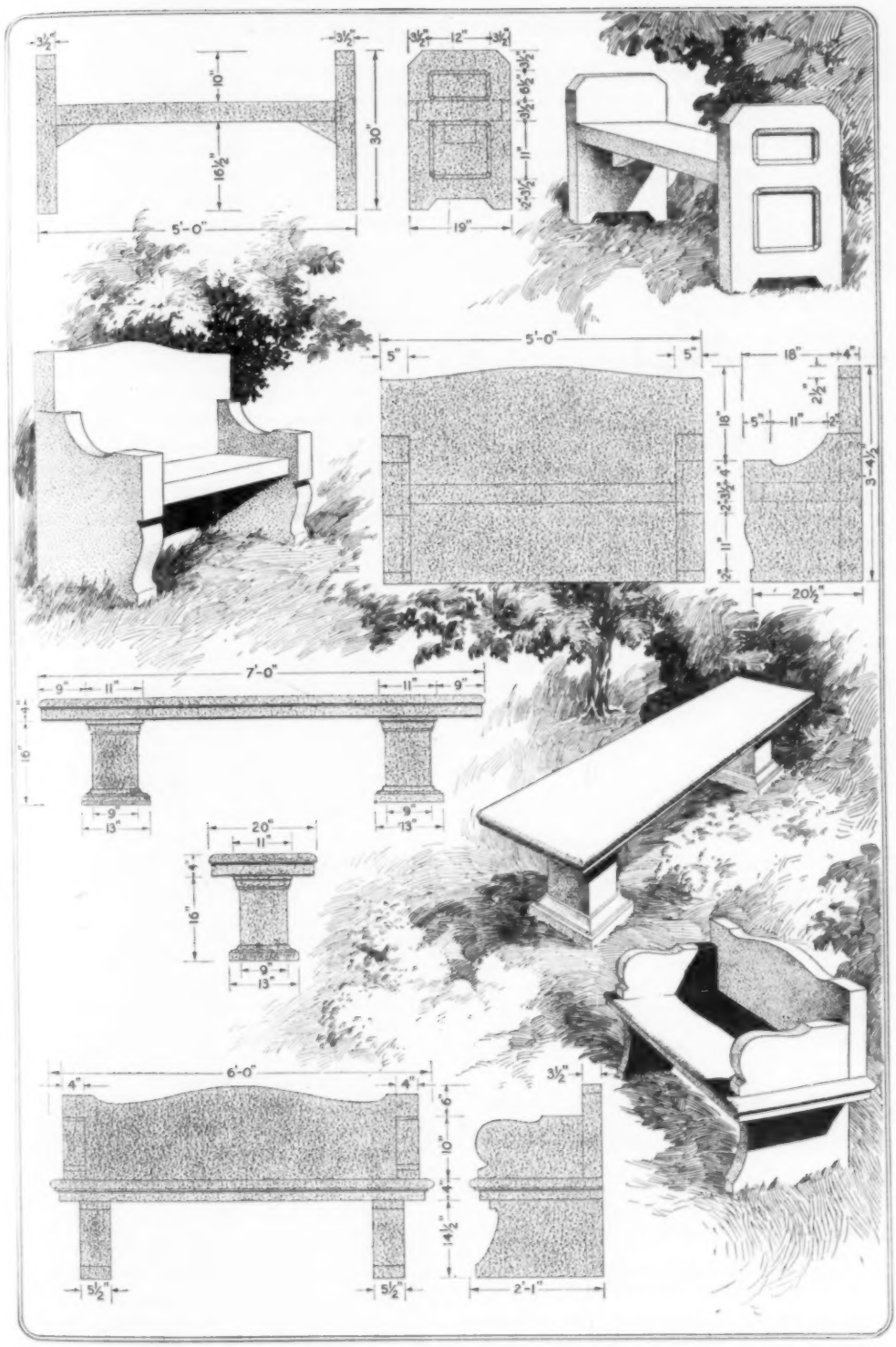


Fig. 4
The Method of Making the Edge Panels and of Reinforcing the Top Slab

Fill the mold uniformly to a depth of 1 in. and set the reinforcing into place, as shown in Fig. 4. The concrete should be wet enough so that water will rise to the surface with slight jar it to force the mixture well into the corners. Level the surface with a straightedge, and finish it carefully with a trowel. The edges may be rounded slightly with an edger or struck off at a slight bevel, using the trowel. The supports are made similarly, but without reinforcing. The edges are left square.

Permit the filled mold to remain at least 48 hours, when the sides of the form may be removed. The slab must not be moved from the platform, on which it was cast, for at least a week. If the edges are chipped or corners broken away, patch them by moistening the broken parts and filling the irregularities with the mixture. The slab should be moistened two or three times a day while "curing," and should not be exposed to heat, to a drying wind, or to the sun. Set the foundations, leveling them with great care, and mount the supports on them, set in a course of cement mortar. Set the top slab into place, upon courses of cement mortar, if no bolts are used.



These Garden Seats and Benches of Simple, Dignified Design may be Made by One of Fair Mechanical Skill at Small Outlay. They Add to the Comfort and Beauty of the Home Grounds, and Are of Substantial Construction, to Withstand the Elements

The advantage of using bolts is that the seat may be taken down readily and moved to a new setting.

Possibilities for simple ornamental

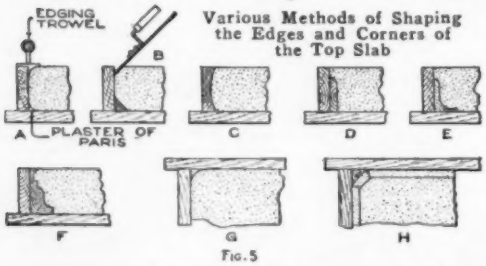


Fig. 5

treatment of this garden seat and slight variation in the finishing of the corners and edges are shown in Figs. 5 and 6. Finishing of the edges of the top slab in curved, straight-line, and molded forms are shown in Fig. 5. The use of a plaster-of-Paris fillet in the lower corner of the mold, and the rounding of the upper edge with an edging tool, are shown at A. The beveling of the lower edge by means of a triangular wooden fillet and the striking off of the upper edge with a trowel are shown at B. Views of the filled mold from above, the corners shaped with fillets, are shown at G and H.

The paneling of the edges of the plain slabs, as shown in Fig. 1, relieves the severe outline and adds a touch of

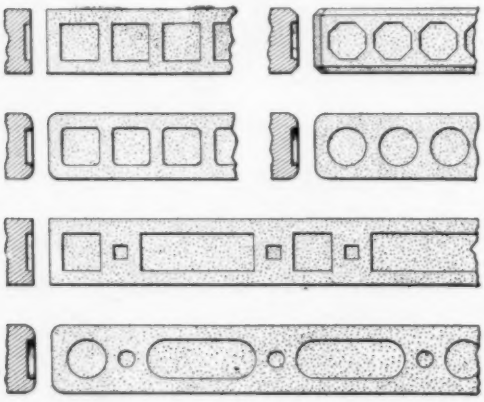


Fig. 6
Several Panel Treatments of the Edges, the Panels and Corners Designed to Harmonize in Each Case

individuality. The panels are ⅜ in. in depth and are made by nailing blocks into the form, as shown in Fig. 4. Bevel their edges slightly to produce "draft" for the easy removal of the form, as indicated in the cross sections in Fig. 6. To insure that the concrete is cast around these blocks, press the mixture into the corners as the mold is filled. Several forms of panels are shown in Fig. 6, the edges of the slabs being shaped to harmonize with them.

New constructive elements are introduced in the forms for the garden seat shown in Fig. 3. The top slab is made 3 in. thick, 20 in. wide, and 5 ft. long, by the process described for the first seat. The supports are 4½ in. thick, and in their simplest form may be made with a cap and base effect, on the edges only. The working drawings and sketch show pilasters, ½ in. thick, on the outer sides, produced by panel-

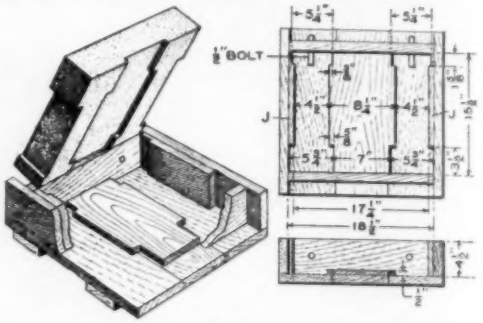


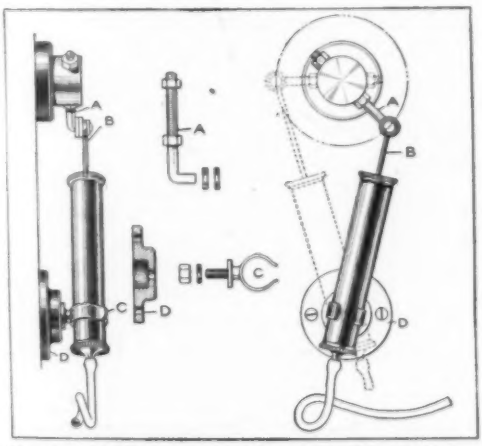
Fig. 7
The Form is Built Up Accurately and the Mold Poured. The Sides of the Form are Removed, the Support being Shown in Diagrammatic Relation to the Form Only

ing the surface. The detailed construction of the form for the supports is shown in Fig. 7. Make the form with inside dimensions of 15½ by 18½ in. Make two strips J, ⅝ in. thick, with a ⅜ by 1⅝-in. rabbet at the upper end, and nail them to the sides of the form, as shown. Make a piece ½ by 8¼ by 15½ in. for the panel mold. Rabbet the upper corners ⅜ by 1⅝ in., and the lower ones ⅝ by 3½ in. Bevel the edges on the sides and at the rabbets to give "draft." Nail the panel carefully into place in the bottom of the mold, centering it to make the pilasters of the columns each 4½ in. wide. Fix the sides into place with screws. Round off slightly all sharp corners, and set the nails, filling the holes with plaster of Paris. Smooth the inside of the mold,

and clean, shellac, and oil it. Set the bolts which join the top slab and the support into the upper end of the form, and the mold is ready to be poured. Fill the mold with a 1:3 mixture of Portland cement and coarse, clean sand, and proceed in general as in the making of the slabs for the first seat.

Air-Pump Blower Driven by Punch Press

The pump shown in the sketch was devised for blowing away punchings of a light material and for keeping the parts of the dies clear. The pump was fastened to the shaft of the press by means of the shouldered bolt A, fixed in place with two nuts, as shown. The plunger of the pump B was fastened to the shoulder of A, and the body of the pump was inserted in a clip, C, fixed to the side of the press. The clip was made in the form of an oarlock and bolted to a flange, D. The latter was fixed to the punch press with flat-head screws. The rubber hose connected to the lower end of the pump is just long enough to reach the dies. The pump may be removed from the clip easily

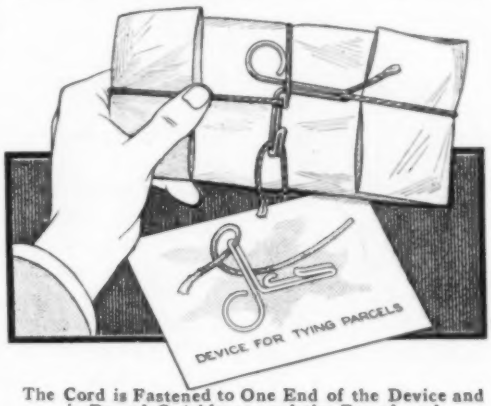


The Pump is Fixed to the Side of the Punch Press so That It is Operated Automatically, and Is Removable by Reason of the Clip C

and released at the shoulder of the bolt A, for use in the ordinary fashion.—George P. Kuhne, East Rutherford, N. J.

Device for Tying Parcels

The wire clip shown in the illustration was devised for use in tying parcels temporarily, and is especially



The Cord is Fastened to One End of the Device and is Passed Quickly around the Parcel and Locked at the Hook

convenient for bundles of letters and other small objects. It is bent from a piece of wire to the shape shown, and one end of the tying cord is clamped in the folded portion of the wire. Starting from this point of fastening, the cord is passed around the parcel, hooked to a small projection at the center of the device, passed at right angles around the parcel and clamped under the hook as indicated. The round loop is used in grasping the device and steadying it while the cord is drawn rapidly into place. The cord is released quickly by removing it from the hook, and the device, with cords of various lengths, may be prepared and kept on hand for repeated use.—E. E. Burnham, Amite, La.

Remedy for Noisy Telephone Bells

In a large office where each desk has its individual telephone the repeated ringing of the various call bells is annoying. Especially is this true if the telephone bells are highly pitched. To eliminate this feature, a large concern, which owned its telephones, had the bells slotted twice with a hacksaw. A metallic, unobjectionable buzzing sound results when the operator rings a station.

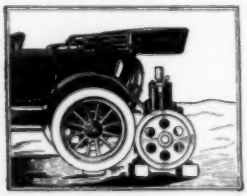
Garden Dump Cart of Varied Uses

The cart shown in the illustration gives better service than a wheelbarrow, and was made from materials gathered in the barn and home workshop. The fact that it can be tipped to dump off loads readily, as shown in the illustration, makes it handy for hauling dirt for the garden and tennis court, and the transporting of sod. On the lawn it carries tools, grass, and water. In the garden and orchard it is used to carry fruit, vegetables, and other products, its width being such as to fit conveniently between the rows.

The cart was made by cutting off the rims and spokes of an old set of buggy wheels, and nailing double barrel hoops on them. These were covered with old bicycle tires, affording a good protection when the cart is used on lawns. A wooden axle was provided and the braced handle fitted to one end at a height convenient for pulling or pushing the cart.—E. R. Smith, Walla Walla, Wash.

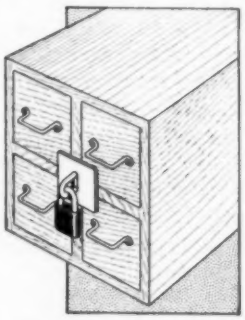
Spinning a Cranky Engine

After overhauling and tightening the bearings of a marine engine, it was found necessary to crank it by other means than by hand. The only available power was an automobile, one rear wheel of which was jacked up, the other three blocked, and the motor mounted on skids, placed as shown in the sketch. Its flywheel was set in contact with the tire of the raised wheel of the automobile. By engaging the clutch gently, the cranky engine was caused to operate, and in a few minutes was running on its own power.



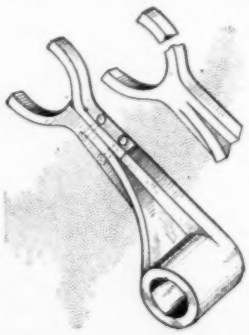
Locking Four Drawers with Plate Hasp

It is sometimes not practicable to provide separate locks for several adjacent drawers, and under these circumstances the plate hasp shown in the sketch was used with satisfaction. A staple riveted into a plate was fastened to the strips between the drawers, and a square plate having a suitable slot cut in it was fitted over the staple. A small lock secured to the staple locks the drawers effectively.—Joseph Prophet, Pittsfield, Mass.



Shifting-Fork Repair

The shifting fork on an automobile gear box broke at one of the prongs, and a new one was made to replace it, as shown in the illustration. A piece of strip steel was bent to the same shape as the broken prong, and a portion was cut out of the shank of the fork into which the strip was fitted. Two $\frac{3}{16}$-in. flat-head rivets were used to fix the prong in place. The repaired fork has given satisfactory service under hard usage.



¶Graphite and oil will arrest cutting in bronze bearings when oil alone proves ineffective.

Mitered Corner That does Not Show Wear

In mitering edges subject to constant wear the usual way of having a sharp mitered corner is not satisfactory. In many instances a sharp edge is not desirable, and once it wears, it is unsightly. This is particularly true of tables where strips are mitered onto the edges of the top, either to make it appear heavier or to hide the end grain. The disadvantages of having a sharp miter in such a place results in the common use of a thin strip plain-butted and glued to the edge. This shows the joint and gives the article a cheap appearance.

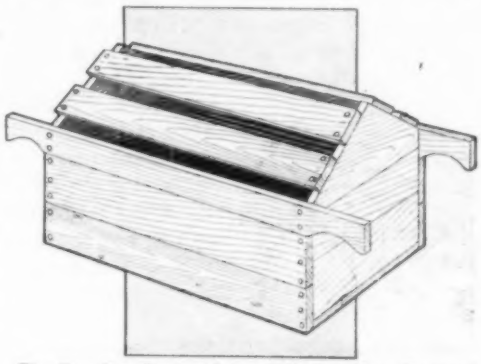
An effective means of overcoming these difficulties is to make a sharp mitered edge on the main piece, and a rounded mitered edge on the trimming. This affords protection for the end grain and is not easily affected by wear.

Bottle Stopper and Filler for Ruling Pens

The ordinary quill fixed to a bottle stopper for use in filling ruling pens is unsatisfactory in that it does not deliver a uniform quantity of ink. A stopper that can be adjusted to the depth of the ink in the bottle is made by inserting the glass from an eye dropper through the cork of the bottle. The glass is adjusted to the depth desired and as much ink as is needed may be released by controlling the air supply with the forefinger, at the upper end of the glass.—Francis W. Nunenmacher, Berkeley, Calif.

Shipping Case Insures Carrying Batteries or Liquids Upright

The shipping case shown in the sketch was devised for a large storage-battery concern after difficulty had been encountered in shipping batteries without pouring out some of the acid. It is useful also as a crate for shipping bottles of liquid which must be transported in an upright position. The unusual shape of the case attracts attention and it is not likely that it will be placed in any other than the desired position. The handles are provided for

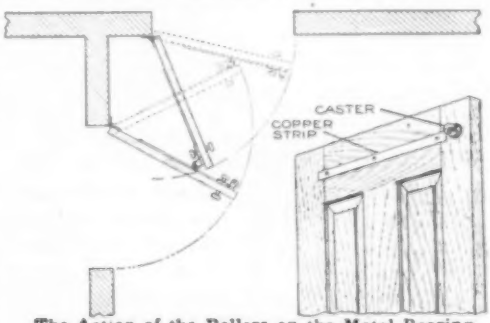


The Peculiar Shape of the Shipping Case Insures That the Contents will be Kept in an Upright Position

convenience in carrying, and the contents may be removed quickly by unfastening the boards at the top.—Joseph P. Bowles, New York City.

Rollers Prevent Marring of Adjoining Doors

The knobs of adjoining doors frequently cause a marring of the finish and bruising of the woodwork, which may be avoided by the use of the roller device shown in the sketch. A copper strip is placed on each door so that a roller on the other door operates on it. The strips and casters should be placed so that their action will not interfere.

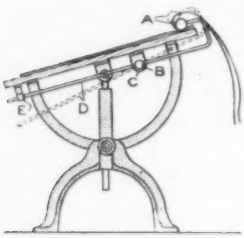


The Action of the Rollers on the Metal Bearing Strips Prevents the Marring of the Doors

If the fittings are selected carefully and installed properly, they will not spoil the appearance of the woodwork.—L. F. Richards, Dorchester, Mass.

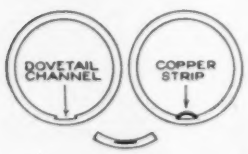
Holder for Examining Drawings

Unnecessary wear on drawings, or blueprints, and considerable inconvenience are often caused in drafting rooms and elsewhere when drawings must be referred to repeatedly, on various parts of a set, or roll. The device shown in the sketch is a holder that may be fixed to the drafting table, or other convenient place, for examining drawings, and prevents wear as well as makes consultation of the drawings easy. A wooden cylinder, A, 1½ in. in diameter, and as long as is necessary for the drawings, is supported on two ⅜-in. rods, which are fixed to the bar B. The latter is supported by two brackets C, fastened to the under side of the drawing board. A rod, D, is fixed to the bar B and extends to a convenient point at the front of the drawing board, or table. The hook E holds the rod D in position. To release the drawings, unhook rod D and move it downward, pivoting on B, as shown by the dotted lines. The rod D should be so arranged that when it is in the hook E, the proper pressure to hold the drawings is given to the cylinder A.—H. P. Morgan, South Norwalk, Conn.



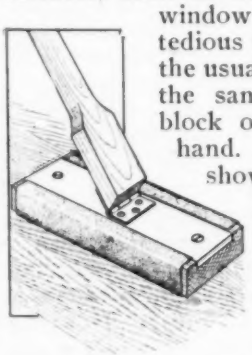
Motor Cylinder Repaired with Copper Strip

One of the cylinders of an automobile was scored badly the full length of the stroke by the loosening of a wrist pin. There was not time to have the cylinder rebored, so an emergency repair was undertaken with success, as follows: The cylinder was dismounted and a channel was cut in the shape of a dovetail, as shown in the sketch, extending from the end of the cylinder to the other end of the scored portion. The channel was made to the depth of No. 18 gauge sheet metal, and the bottom of it was rounded to conform to the curve of the cylinder. A strip of copper was wedged into the channel, as shown, and riveted into place. The surface was then dressed down to the proper curve and scraped smooth. The strip must be curved slightly, as indicated in the sketch at the right, in order to fit into the channel. Nearly the full power was obtained from the cylinder.—Logan E. Anderson, Cove, Ore.



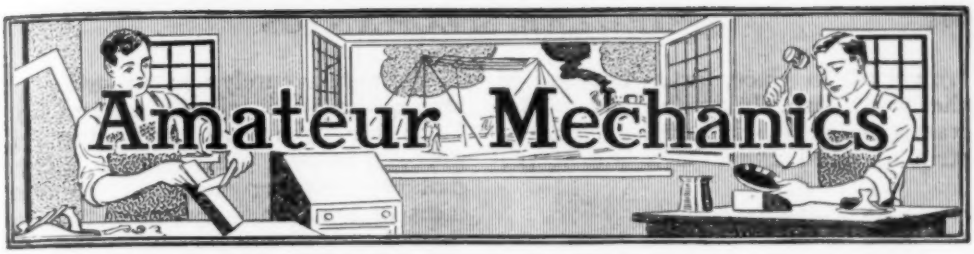
Sanding Block for Interior Trim and Floors

Sandpapering, especially on large surfaces, such as floors, or door and window casings, etc., is a tedious task when done in the usual way by gripping the sandpaper around a block of wood with the hand. The device shown in the sketch provides a convenient method of applying the sandpaper and is especially useful, by reason of the handle, in reaching casings and other woodwork at a considerable height above the floor. The sandpaper is gripped in the block by inserting it under the piece fastened in the top with screws.—Guy E. Waite, Ottawa, Ill.



Notch in Wick Improves Lamp Flame

A railroad brakeman who had an unusually bright light in his lantern explained that it was due to the care given the wick. He cut a small notch at the center of the edge of the wick, causing the flame to have a notched outline at its top. This gave relatively more light than the flame from a wick cut square across.—C. E. Drayer, Cleveland, Ohio.



Portable Fence for Baby's Play Area

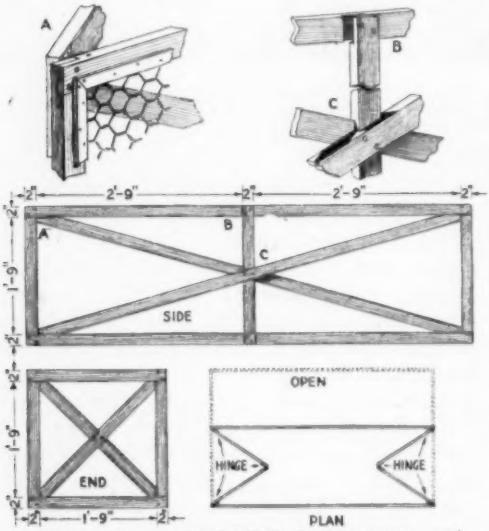
By L. N. ROBINSON

A CHILD in the "toddler" stage should be provided with a safe place in which to play without disturbing the household routine of the busy mother too frequently. The folding wood-and-wire fence shown in the illustration meets this need in a practical and inexpensive manner. It may be used in the home or out of doors, the fence being especially useful in the latter case, since it protects the child, and likewise the lawn flowers, which a youngster, unguarded, may injure. The fence is 25 to 32 in. high, strong enough to support a grown person sitting on the edge of it, and incloses an area of about 4 by 6 ft. This is ample for the child, and the folded fence is thus not too bulky to be transported easily. The materials cost less than $3.50, including hardware for the making of the fence, as shown in the working drawings. The wood used for the main frames is ½ by 2 in., and they are covered with wire mesh, the edges of which are nailed under strips, on the outer side of the frames. Care should be taken to insure that none of the wire strands is exposed, thus endangering the child, or the clothes of passers-by. The frames are hinged together, as shown in the plan, and fold into compact form. Two long and four short frames are required. Cut the top and bottom rails of the long frames 6 ft. in length, and those of the shorter frames and the stiles 25 in. The corner joints are cross-lapped by cutting away one-half the thickness of each strip, as shown at A. The joints at the top and bottom of the center stile, or vertical piece, are made as shown at B, and the joints at the crossing of the center stiles and the cross braces, as at C. The braces only are notched to fit the stile. Each of the joints is fastened with flat-head screws, countersunk. The ends of the braces are cut to fit flush into the corners of the frames, and are nailed in place. This provides a flat nailing surface for the wire mesh and the strips that cover its edges.

A Safe Play Space Either Indoors or Outdoors is Provided for the Child, and the Fence may be Moved Easily. The Construction Is Light yet Stable, and can be Carried Out without Difficulty by the Home Woodworker

Before putting on the wire mesh, all the exposed corners should be "broken" slightly with sandpaper, the wood wiped smooth, and finished with a coat of shellac. The wood may, of course, be left unfinished. In fixing the 1-in.

wire mesh in place, fasten one end of the piece squarely at the end of the frame, nailing it with staples. Place a strip of wood under each end of the



Join the Pieces with Well-Made Lap Joints, and Hinge the Frames as Indicated

frame and bear down on the middle of the frame, or weight it, to produce a bowed effect. Then nail the other end of the wire securely; on removing the strips, the wire will be drawn taut. Tack the edges down, and repeat this process on the other frames. Next nail the covering strips on the front faces of the frames, mitering them at the corners, as shown at A.

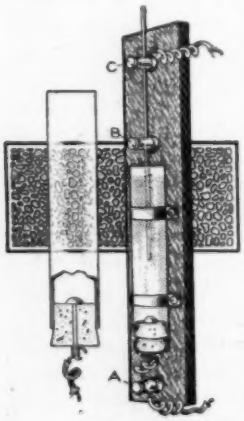
The frames are then joined by means of hinges, as shown in the plan at A. Care should be taken that they are set so that the corners of the fence meet squarely and evenly when it is opened. Metal drawbolts should be fastened horizontally, one on the top of each folding joint between the end sections. These will prevent the child from folding the ends in, and possibly injuring its fingers. The completed fence is then given a final coat of shellac or varnish, the galvanized wire being left unfinished.

The materials required for the fence are as follows, the wood being listed in lineal feet, and smoothed on four sides to the dimensions indicated:

155 ft. ½ by 2-in. clear pine.
50 ft. ¼ by 1-in. clear pine.
22 lineal ft. 1-in. mesh, 2-ft. wide wire fencing.
6 pairs 1½-in. iron plain butt hinges, with screws.
2 steel drawbolts, with screws.
½ pt. white shellac.

Water Rheostat for Small Electrical Devices

The rheostat shown in the illustration can be made quickly and at small expense. The base consists of a piece of wood, ½ by 2 by 12 in. A glass tube, 1 in. in diameter and 6 in. long, is fastened to this with strips of sheet metal. A large brass tack is driven into a cork, and the cork is inserted in the lower end of the tube. A wire runs from the brass tack to the binding post A. The lower part of the tube should be paraffined to make it water-tight. A brass or copper rod is placed through the binding posts B and C. The resistance can be changed by sliding the rod up or down. The tube is nearly filled with water having a small quantity of salt dissolved in it. The amount will depend upon the current to be reduced. The rheostat should be fastened to a wall, or other support, and may be used to regulate the speed of small motors and other electrical devices.—R. R. Wayt, Pittsburgh, Pa.



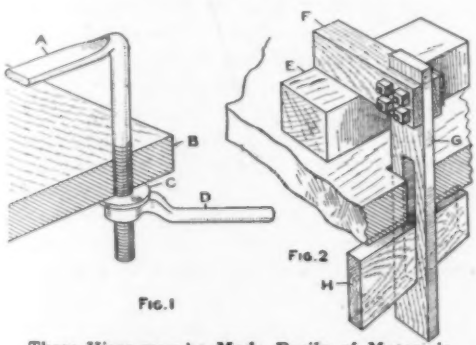
White Blotting Paper Improves Light Reflectors

In the lecture and classrooms of a large university it was found that reflections of the electric-light bulbs in the glazed porcelain reflectors were extremely annoying to the eyes of students, and concentration of sight on the blackboard was difficult. A num-

ber of tests were made, and the following method proved successful, eliminating the glare and the reflections. Large sheets of white blotting paper were cut to fit the inside of the reflectors, and then glued to their surface. The soft, somewhat rough surface of the blotting paper diffused the light, so that the glare was overcome. —C. M. Hall, St. Louis, Mo.

Two Simple Vises for the Home Workbench

Boys, and other amateurs, sometimes have need of a vise when a commercial article or one of standard type cannot be had readily. The devices shown in the illustration will give good service and can be made of material easily obtained. The vise shown in Fig. 1 was made of old machine parts, consisting of a bolt and a wing nut. The bolt A was flattened at one end and bent at a right angle. A hole to fit it was bored through the top of the bench B, and the washer C and wing nut D were put in place. The piece to be gripped is clamped under the end A. This device should be fitted near the end and front edge of the bench.

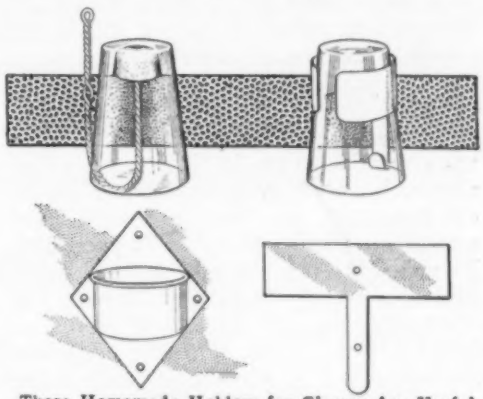


These Vises may be Made Easily of Materials Available in Most Workshops

The vise shown in Fig. 2 grips the block E in the same manner as the first vise. The jaw F is bolted to a vertical piece, G, which is fitted into a mortise cut through the bench top. The wedge H passes through a mortise in the piece G and clamps against the lower side of the bench top.—James E. Noble, Toronto, Can.

Drinking-Glass Holders Easily Made

Several styles of holders for a drinking glass are suggested in the illustration. They may be made of durable



These Homemade Holders for Glasses Are Useful and Quickly Constructed

materials easily obtained in the home workshop. The first is made by twisting a galvanized-iron or brass wire, as shown, with an eye and a loop for fastening it to the wall. A cork is fixed to the upper end, on which to rest the glass. The lower sketch shows a holder of the cup type made by riveting a metal cup to a diamond-shaped plate, the latter being fastened to the wall. The holder at the right is made from a piece of sheet metal cut to the shape indicated below. It is bent to the shape shown, and the lower end of the narrow strip is curved upward to provide a rest for the edge of the glass. The upper portion of the holder should be large enough so that the glass may be raised sufficiently to fit into the rest. The holes are provided for a fastening.—Frank L. Matter, Portland, Ore.

Emery Needle Cushion on Sewing Machine

A convenient emery pad and needle cushion may be made by inclosing the powder in a long sack, about 1 in. in diameter, and sewing it in place around the arm of the machine. It will thus be close at hand and needles and pins may be stuck in the cushion, free from rust, and will not be in the way.

A Compensated Aerial Cableway

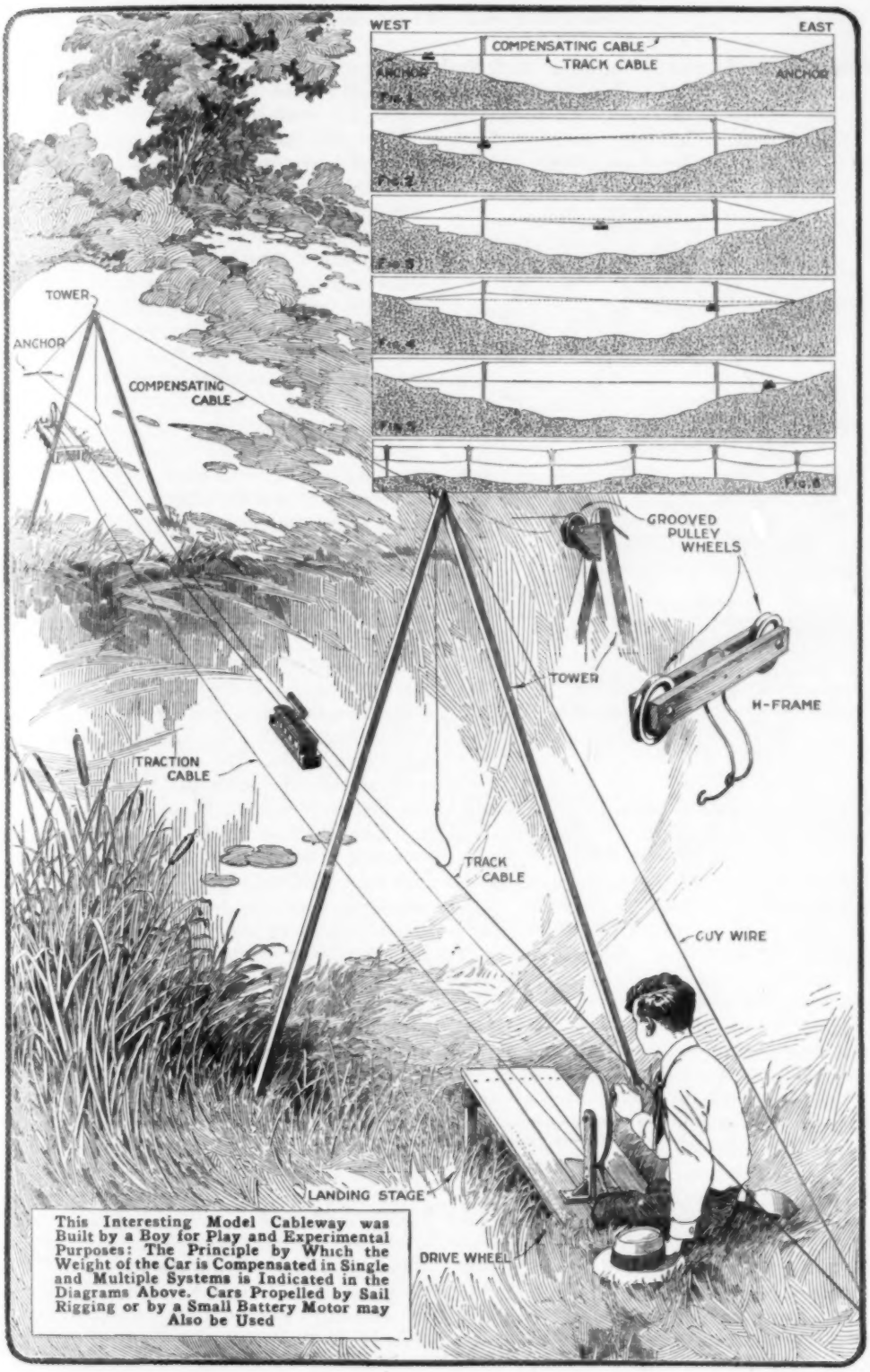
by Edward R. Smith

THE possibilities for practical use as well as novelty for play and experimental purposes make the compensated aerial cableway, shown in the illustrations, not only interesting but also worthy of study. The arrangement assembled in its simplest form with two towers, in the page plate, shows how the weight of the car is compensated, so that a fairly level course on the track cable is provided. The various positions of the load and cables, showing the application of the compensating principle, are indicated in Figs. 1 to 5, and a multiple system is shown in Fig. 6. The details of the constructional parts are also shown. The car may be driven by wind power, as shown in Fig. 7, or by a motor, as in Fig. 8, in addition to the simple application of hand power suggested in the page plate. Devices for automatically reversing the course of the cars both for the sail rigging and with the use of electrical power, are shown in Figs. 7 and 8. By their use it is unnecessary to have an operator at each end of the cableway. The constructional features were worked out first by experiments on models in a shop, and then applied to a large rigging spanning over 100 ft. between the A-frames. The sketch in the page plate was made from photographs of this construction. Application of the compensating principle to carrying and transportation problems affords opportunity for interesting engineering, in spanning streams, cañons, or gulleys.

In most types of cableways a considerable sag is allowed in the cable supporting the car in addition to that caused by its own weight. Even in systems of practically constant cable tension, in which the wire is stretched by enormous weights, the loaded car causes a sag in the track cable, and ascends and descends an incline when approaching and leaving a tower. The aim in the compensated cableway is to overcome this sag as much as possible, and to offer a minimum of resistance to the car in its course.

The simple form of compensated cableway shown in the page plate is made by setting up two A-frames, with wire braces supporting them, and mounting the track and traction cables upon them. A light, flexible compensating cable extends from one tower to the other and is fitted to grooved pulley wheels at the tops of the towers, as shown in the detail at the right. The ends of the cable are fixed to wire hooks, from which the track cable is suspended. The latter is anchored at the ends of the wire braces supporting the A-frames. In order to understand the operation of the system it is desirable that the course of a load be traced in its various stages, as indicated in the diagrams, Figs. 1 to 5. For diagrammatic purposes the load is shown passing from the west slope to the east. As the load passes under the first A-frame, as in Fig. 2, the track cable is drawn down at that point; the corresponding end of the compensating cable is also drawn down, raising the opposite end of the track cable, and taking out most of the sag in the center portion of the track cable. As the load passes to the center position, as shown in Fig. 3, the track cable resumes a more nearly horizontal position. When the second A-frame is reached the load draws the corresponding end of the compensating cable down with the track cable, Fig. 4, and the latter assumes its normal position as the load reaches the end of the course. It is evident from the diagrams that the course of the load is more nearly level than it would be if the sagging of the track cable were not counteracted.

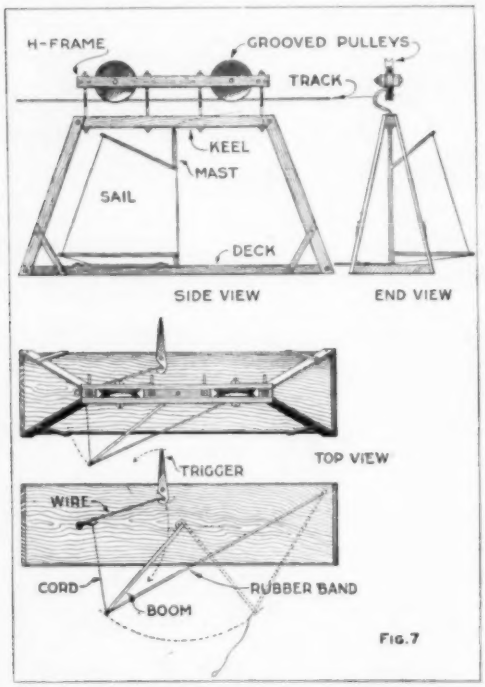
For use with a multiple-frame system, the cables are arranged in units between supports, as shown in Fig. 6. The compensating action is similar, the tendency being to level the entire course of the load. The weight of the



This Interesting Model Cableway was Built by a Boy for Play and Experimental Purposes: The Principle by Which the Weight of the Car is Compensated in Single and Multiple Systems is Indicated in the Diagrams Above. Cars Propelled by Sail Rigging or by a Small Battery Motor may Also be Used

car and load only is compensated, and since the weight of the cable will cause a sag, the course cannot be level, but may approach this condition.

A model of the compensated cable-



The Car is Propelled by the Wind Acting on a Sail Controlled Like the Main Sheet of a Sailboat in Tacking. The Trigger Device Releases the Sail, Reversing the Course of the Car

way, as shown in the page plate, or on a smaller scale, may be made by a boy of fair mechanical skill. For experimental purposes the detail may, of course, be refined to a high grade of workmanship, if desired. The size and dimensions of the parts need not be proportioned precisely as shown, but may depend more or less upon the materials available. The track cable should be made of galvanized-iron wire, the compensating cable of fish-line, and the towers of 1-in. stuff, the width of the pieces making up the A-frames being increased in proportion to the height. Grooved pulley wheels, set in housings fixed to the top of the A-frames, carry the compensating cable. These may be made of wood, built up in three sections, to provide a flange on each side of the cable groove. The A-frames should be joined strongly at the top, and braced to anchors, sunk into the ground as shown. The hooks from which the track cable is suspended are made of heavy wire, bent so as not to interfere with the H-frame hanger supporting the car, and looped around the cable.

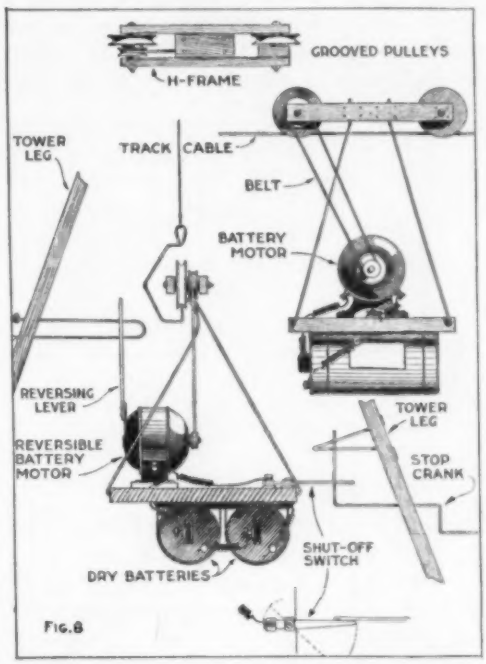
Various types of hangers may be devised to house the two pulley wheels which ride on the track cable. A simple H-frame hanger is shown in the detail sketch in the page plate. The grooved pulley wheels are set on bolts, and a heavy wire is bent and set through the center block as a support for the car. For experimental purposes, or even for play, when it is not desired to make a more elaborate car, a wooden block or other object of sufficient weight may be used as a load. An interesting feature of the work, especially for a boy, is to devise a realistic coach model, as suggested in the sketch. A wooden block forms the base, and the roof and platforms are made of sheet metal. The windows and doors are painted on the metal. The inventive boy may, of course, build a car with a hollow metal or wooden body, and weight it properly to provide the necessary load.

The motive power is provided by means of a cord, or traction cable, carried around two large grooved pulleys, mounted in supports fixed to the landing stages at each end of the cableway. They are made of wood, a suitable groove being cut around the edge with a saw, and smoothed with a small round file, or sandpaper wrapped over a round rod. The traction pulley is turned by means of a crank, set on the bolt which is used as an axle. The traction cable must be drawn sufficiently taut to provide the necessary pressure on the grooved pulleys, or it will slip. Rosin applied to the pulleys and the cable will tend to prevent this.

If the frames and other fittings have been properly set up, the cableway will support a sail car, shown in Fig. 7, or a two-cell electric car, driven by a small motor, as shown in Fig. 8. The sailing-car arrangement is often fea-

sible, since a stiff breeze is common in gorges, cañons, narrow valleys, or even in ravines where such a cableway might be set up. The hanger is an H-frame having the grooved pulleys bolted in it, and further reinforced by small blocks at the ends. A braced frame, supporting a deck on which a mast is set, is suspended from the hanger by four curved wires, as shown in the side view, Fig. 7. A sail with boom and gaff is supported by the mast. It is arranged to be shifted around the mast, which is accomplished automatically at the end of a run, or "tack," by means of the trigger device shown in the top view. The sail is controlled in relation to the wind much as is the main sheet of a sailboat. The car can be operated in this manner only at right angles to the direction of the wind, or nearly so. For play purposes, a boy stationed at each end of the cableway can shift the sail, but the trigger device shown makes this unnecessary. A rubber band is attached to the boom, as indicated in the top view, and a cord and wire are arranged to engage a trigger. A stop for the trigger is fixed to the A-frame so that it is sprung when the car reaches the end of the run. The rubber band reverses the sail, the car having been set on the cable originally so that the forward end is in proper relation to the wind.

The electric car is especially interesting in that it provides self-contained motive power by means of a battery of dry cells, and a motor belted to the hanger, as shown in Fig. 8. The hanger is of the H-frame type with heavy blocks between the sidepieces to provide for the small grooved driving pulley set on the axle of one of the larger pulleys. A wooden deck, supported by four heavy wires set into the center block of the hanger, carries the motor, and the dry cells are fixed under it. The motor is of the small reversible battery type, and should be provided with a reversing lever. This will make it possible to reverse the car when it reaches the end of its course. The motor and cells should be disposed so as to balance, tests being made for this purpose before setting them in place finally. A cord or small leather belt connects the drive pulley of the motor with the proper pulley on the



The Electric Car Is Self-Contained and may be Reversed Automatically, if the Motor Is of the Reversible Type, by Contact of the Lever with the Stop Fixed to the A-Frame

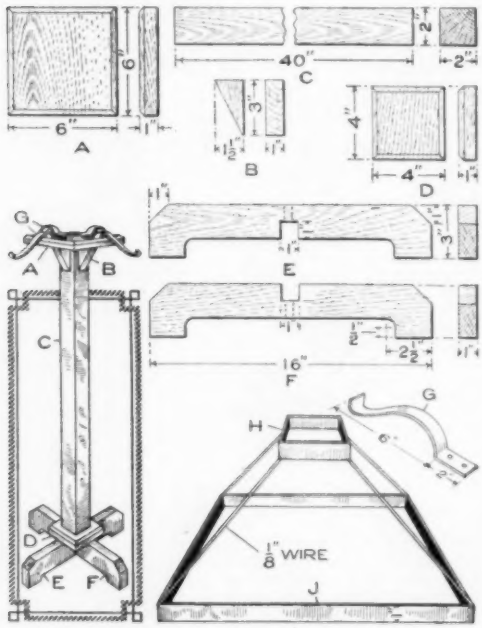
hanger. These pulleys should be in line, and that on the hanger should be five times the diameter of the one on the motor shaft. The power is shut off at the end of the course by a shut-off switch which strikes a stop crank attached to the A-frame. When the reversing lever and stop are used, the stop crank is unnecessary. A nonreversing motor can be made to drive the car in a reverse direction by removing the belt from the motor pulley and replacing it to make a figure-eight twist.

¶When babbitt metal is heated some of the tin and antimony in it is burned out, making it unsuited for use in machinery bearings, and similar purposes, after several heatings. The oxidation of the metal is indicated by the formation of a scum on the surface.

A Piano or Reading Lamp

By WILLIAM E. FINKERNAGEL

THE lamp illustrated was designed for use in reading, the doing of hand work at which one is seated in a chair away from a table lamp, or for lighting a piano rack. It is light, readily moved about, easily made, and



This Lamp of Substantial Construction and Pleasing Design may be Made at Small Cost. The Pedestal Assembled is Shown at the Left and the Details of the Parts and of the Metal Frame for the Shade, Above

of pleasing design. It combines construction in wood and metal, is inexpensive, and within the range of a careful amateur craftsman. The pedestal is shown assembled at the left, and above are detailed sketches of the parts. The construction of the shade, which is 18 in. square, is shown at the right. The central post is 40 in. long and 2 in. square, and the base measures 16 in. on the arms.

The stock bill for the lamp is as follows:

1 piece, 2 by 2 in., oak, for post.
2 pieces, 1 by 3 by 16 in., oak, for base.
1 piece, 1 by 6 by 6 in., oak, for cap.
1 piece, 1 by 4 by 4 in., oak, for column base.
1 piece, 1 by 2 by 3 in., oak, for braces.
Copper or brass strip, 1 in. wide and 3/32 in. thick, for shade frame. Wire braces for shade.

Make all the pieces, smoothing and finishing their surfaces with a scraper, before assembling the parts. The cap A may be made first. Square the piece to 6 in. and cut a ¼-in. chamfer around the upper edge. Cut the 2 by 3-in. block on one of its diagonals and smooth it to form the braces B. Square the ends of the post C to a length of 40 in., and smooth up the sides. Square the column base D to 4 in. and cut a 3/16-in. chamfer around its upper side.

Square up and smooth the cross arms E and F, for the base, to a width of 3 in. and a length of 16 in. Bevel the upper corners 1 in., at an angle of 45°. Bore holes with a ½-in. bit to form the rounded ends of the portions cut out from the lower sides of the cross braces. Chisel the wood away between the holes and smooth the resulting surfaces. The half-lap joint, by which the cross braces are joined, may then be made. It should not be made until the lower portions are cut out of the cross braces, and the remaining portions are made of exactly the same width, 2½ in., according to the drawing. The joint must be fitted tightly in what is termed a driving fit, or it will not be strong enough.

The construction may be assembled as follows, although several methods may be adopted that will prove satisfactory: Fix the cap A to the top of the post with glue and ½-in. dowels, bored not quite through the cap. Screws may be used for this purpose, but they mar the finish of the upper surface of the cap. Glue the braces B into the corners to support the cap. They should be warmed before applying the glue and rubbed slightly to bring them into place tightly and to distribute the glue evenly. Small brads may be used to nail them in place, but care must be taken not to mar the finish.

The column base D may be fixed to the bottom of the post in the same way that the cap was fixed at the upper end. The cross braces E and F, form-

ing the base, should be glued in the half-lap joint and fixed to the column base with glue and dowels, or screws sunk into sockets from the lower side of the braces.

When the glue has dried, the pedestal should be scraped and cleaned preparatory to a final sandpapering before applying the stain and varnish.

The arms G for the shade holder are made of strips of brass or copper, 1 in. wide and 8¾ in. long, bent to the proper form, as shown in the sketch. The straight end, 2 in. long, is provided with two holes through which screws are fixed into the top of the cap.

The shade is constructed as follows: Make a 4-in. square, H, of brass strip, 1 in. wide, and solder or rivet it at the joint. Make the lower square J of the same material and in the same way, 18 in. on each side. Solder ⅛-in. wire, of a length that will give the desired slant to the shade, at the corners of the squares, forming a rigid frame for the covering. Cloth or silk may be used to cover the frame.

The braces for the shade may then be fastened to the top of the cap, as shown in the assembly sketch, and their ends shaped to hold the frame firmly. The pedestal should be smoothed off immediately preparatory to finishing, and the sharp edges removed slightly. Care should be taken in sandpapering, since rubbing across the grain is ruinous, as is too much sandpapering. The latter particularly smacks of the novice. A coat of stain, one of filler rubbed in thoroughly, a coat of shellac, and a finish coat of wax or varnish will give a satisfactory finish. The shellac and varnish coats should be permitted to dry thoroughly and should then be sandpapered lightly before applying other coats.

The electrical connections for the lamp may be made from a cord extension to a socket fixed in the center of the cap. In some instances it may be desirable to connect the cord from a floor socket. In that case the post should be built up of two pieces of 1-in. thickness, and a groove to admit the cord made in the center of it.

Sewing Rack Attached to Rocker

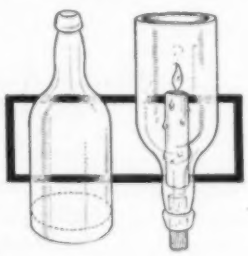
A rack like that shown in the illustration is convenient as a support for articles being sewed or repaired by the

The Swinging Rack Folds under the Arm of the Chair When Not in Use

home worker. It was made by fastening two bars from a towel rack to the arm of the rocker by means of a bolt. When not in use, the bars are folded back under the arm of the chair. One of the bars may be provided with hooks so that scissors and other sewing requisites may be placed on them.—Mrs. J. E. McCoy, Philadelphia, Pa.

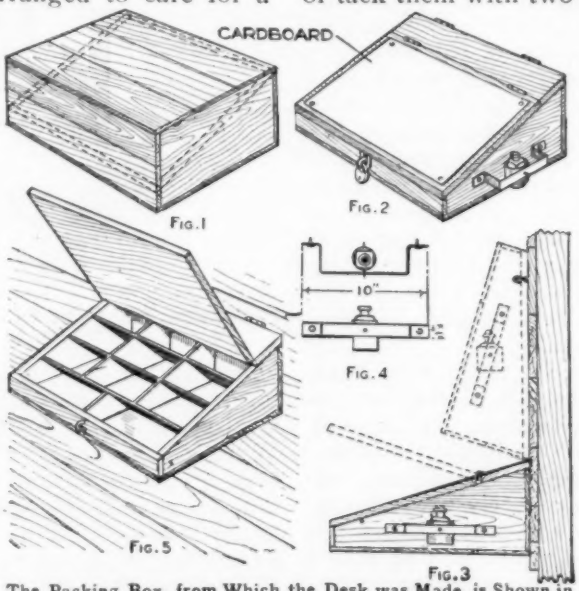
Glass Bottle as a Candle Lamp

A candle may be carried in a glass bottle, as shown in the sketch, with little danger of setting fire to surrounding objects, and without permitting the melted wax to leak upon the floor. The bottom of the bottle is cut off and the candle inserted as shown, the neck affording a convenient handle.—Stanley Radcliffe, Laurel, Md.



A Folding Wall Desk

To provide an inexpensive desk in a shop, where space was quite limited, the folding wall desk shown in the sketch was devised. It was cut from a packing box and the hinged lid built up of boards of better quality. To give a good writing surface, a piece of heavy cardboard was fastened to the writing bed with thumb tacks and may be renewed whenever necessary. The inside of the desk was fitted with filing compartments arranged to care for a large variety of shop forms and stationery. An inkwell holder made of a strip of sheet metal was fixed to the end of the desk and the bottle suspended in it, there being space for additional bottles also. The hinged lid is provided with a hasp and padlock. When not in use the desk may be tilted upward and locked against the wall with small catches. By using a T-square against the left edge of the writing bed, a convenient drafting table for shop sketching is provided.



The Packing Box, from Which the Desk was Made, is Shown in Fig. 1. The Dotted Lines Indicate Where It was Cut to Give the Slanting Writing Surface. The Device in Its Normal Position is Shown in Fig. 2; Hooked against the Wall, in Fig. 3, and with the Lid Raised, Showing the Compartments, in Fig. 5.

The detailed construction, for the making of the desk from stock lumber, by boys, or amateur workers with tools, may be carried out as follows: Determine upon the size of the proposed desk. Convenient dimensions are 30 in. long, 18 in. wide, 7 in. high at the back, and 4 in. high at the front. Use ⅞-in. soft wood; pine and poplar are suitable. Cut and shape all the pieces before beginning the assembling of the parts. The wood should be planed smooth and may be sandpapered lightly when the construction is completed, before applying a finish. A simple arrangement of the pieces so they can be nailed together is that shown in the sketch, which was used in making the box. First shape the pieces for the sides, 5¼ in. wide at the larger end, 2¼ in. wide at the smaller, and 16¼ in. long. Clamp the boards together, or tack them with two wire nails while shaping them, so that they will be exactly alike. Make a piece 5½ in. wide and 30 in. long for the back, and one the same length and 2½ in. wide for the front. Nail them to the ends, as shown, permitting the slight excess material to project over the upper edges of the sidepieces. Trim off this extra stock with a plane so that the upper surfaces of the front and back conform to the slant of the sidepieces. Make a strip 4 in. wide for the upper edge of the desk, to which the writing bed is hinged. Cut pieces for the bottom and nail them in place.

Before nailing down the upper hinge strip the interior fittings should be made. Use wood not thicker than ½ in., and fit the pieces into place carefully, nailing them firmly through the outer faces of the desk. A better method is to make the pigeonholes or compartments with a piece of the thin stock on the ends of the partitions, so that the compartments are built up as

a unit and slid into the desk, no nails being necessary to hold them.

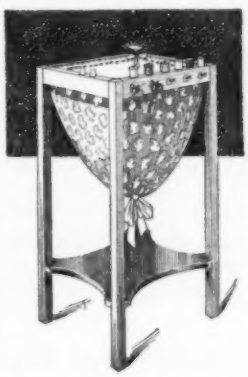
The lid should be made of sound, dry stock and glued up of strips about 3 in. wide, to prevent it from warping or twisting easily. If the person making the desk has the necessary skill, it is best to fix a strip, 2 in. wide, at each end of the writing bed, to hold the pieces together and to keep the bed in shape.

The holder for the inkwell is made of a 1-in. strip of metal, bent to the shape shown in Fig. 4, and drilled to fit small screws. A can is supported in the holder and the bottle rests in it.

The desk may be finished by painting it or giving it a coat of shellac and one of varnish, either after it has been stained to match adjoining woodwork, or in the natural color.

Sewing Stand with Workbag in Top

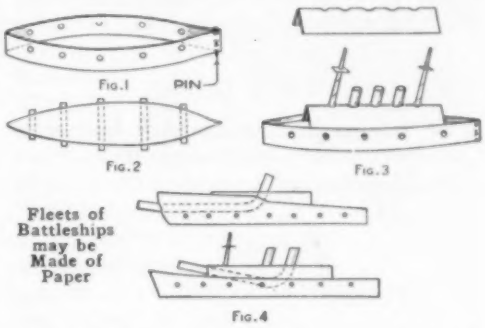
The stand shown in the sketch may be made by using part of a small table, or by building the framework especially for the purpose. It was made for use in connection with sewing and fancy work, and provides for the tools and incidental materials necessary. The stand is 28 in. high and about 15 in. square at the top. The bag built into the frame may be made of any strong, suitable material, and its color should match the finish of the wooden part. A row of nails are set in the top edge of the rails to provide for spools of thread and thimbles. Scissors and other tools are placed on the shoulder hooks fastened on the side of the rail.



When paper sticks to a negative during printing remove it by soaking it in the hypo bath, sacrificing the print rather than the negative.

Toy Paper Warships

With a pair of scissors, pins, and a newspaper or two, a fleet of warships can be made to sail the seven seas of



polished floors. Strips of paper, through which holes at opposite points have been cut, and pinned together at one end, as shown in Fig. 1, are used for the sides of the boat. Rolls of paper are slipped through the opposite holes, as shown at Fig. 2, and provide support for the deck, which is a flat piece of paper pointed at the end to fit between the sides of the craft. A second deck fitted with funnels and masts, as shown in Fig. 3, is made of a folded piece of paper with holes cut through it for the masts and funnels, which are rolls of paper. If plain paper is used, the warships may be made in several colors, which adds to the effect of rivalry between the fleets. Other types of craft may easily be devised, two of which are shown in Fig. 4. Not only the youngsters in the household, but their elders as well, may find not a little amusement and diversion in the making of a fleet of such warships, modeled after battleships, destroyers, battle cruisers, and other vessels.

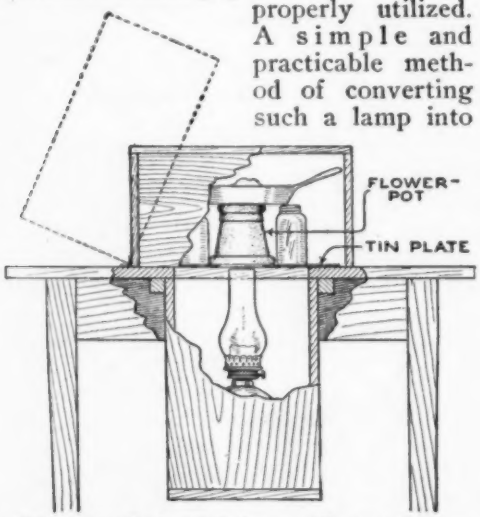
Caster Board for Scrubbing and Floorwork

A board for use in work that requires tedious kneeling, as in scrubbing, repairing of sidewalk lights, and similar work, may be made as follows: Procure a board, ⅞ by 10 by 14 in., and pad it with a section of carpet. Place three casters under it, two being

set at the rear and one at the front edge. If desired, small strips may be nailed at the sides to prevent the knees from slipping off. Such a device enables the user to move along the floor easily without injuring the knees.—R. S. Matzen, Fort Collins, Colo.

A Lamp Cooker

An ordinary circular-wick kerosene lamp produces enough heat to do considerable cooking, provided the heat is properly utilized. A simple and practicable method of converting such a lamp into a cooker is as follows: Saw a hole, 12 in. square, in the top of a small table, or packing box of about the same height as a table. Cover this with a piece of sheet metal, having a 4-in. hole in the center. Place a 5-in. flowerpot over the hole in the metal, and plug up the hole in the bottom of the pot with fire clay or plaster of Paris. Vegetables in jars may be set around the flowerpot to cook slowly and a roast in a pan on top of it. A wooden box, or metal pail, large enough to cover the arrangement, should be placed over it. Air holes should be provided in the lower box and in the cover.



This Lamp Cooker w ll Prepare Meats and Vegetables Satisfactorily, and Is Useful for the Camper and in Emergencies

To operate the device light the lamp and when it is burning brightly, place it under the table, elevating it so that the top of the chimney is in the center and barely within the rim of the flowerpot. Use little water in the vegetables and keep the caps loosely on the jars. The roast, if well buttered, will brown nicely, and while the cooking will require considerably more time than it would in a range, the results will be as good, if not superior. The natural juices are preserved by the slow cooking at comparatively low temperature. The cover may be lifted to turn the meat occasionally. This device will appeal to campers, summer cottagers, and others.—W. W. Baldwin, New York, N. Y.

Placing a Miter Box on the Workbench

In placing a miter box on a workbench considerable space is often wasted, and the workman is obstructed. By raising the miter box on the bench, mounting it upon two blocks, about 6 in. high and set back about 18 in. from the front of the bench, small space is utilized, and the tool may be used as conveniently as otherwise. The space under the miter box and the open space in front of it are available for the disposal of ordinary tools, and there is no danger of the saw striking them. By making another stand, the height of the bearing surface of the miter box, and moving this about on the bench, long pieces may be handled with ease. This stand is removed from the bench when not in use.—Henry Simon, Laguna Beach, Calif.

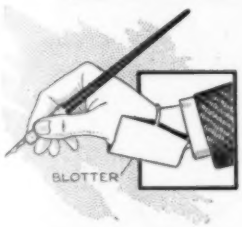
A Book and Document Protector

A device for punching identification marks in the pages of books or papers, may be made easily by setting pins into a small box filled with sealing wax. The box should be large enough to accommodate the desired wording without crowding, leaving about ¼ in. all around the edge. Cut the box, which may be of cardboard, to a height $\frac{1}{16}$ in. less than the length of a common pin. Mark the words to be punched on a piece of cardboard which just fits into the box. Punch holes along the letters and transfer them to the bottom of the

box. Insert pins from the outside through the bottom of the box and permit their ends to come out of the holes in the cardboard guide. Cut away enough of the guide piece so that the melted sealing wax can be poured in, setting the pins firmly. The guide piece is then removed, exposing the ends of the pins about 1/16 in. If the work is carefully done they will be of uniform length. Place heavy blotting paper or cardboard under the page when using the punch.—D. G. Stevenson, Chicago, Ill.

Blotter Attached to Wrist Saves Time

The annoyance of having to look for a misplaced blotter or to pick it up each time a signature is to be blotted, may be avoided by the use of the wrist blotter shown in the sketch. It is made by folding a piece of blotting paper, 6 in. wide and 12 in. long, into three sections. A rubber band is placed in the fold of the blotter and passed around the wrist, thus holding it in place until no longer needed. When one portion of the blotter becomes soiled, the folding may be reversed and a new surface exposed.—Frank W. Roth, Joplin, Mo.



Celluloid Cover for Road Maps

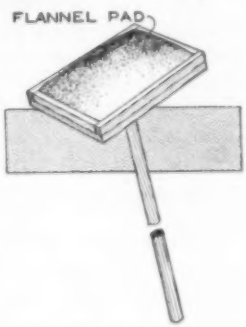
Road maps are easily soiled and torn unless properly protected, and a satisfactory case to hold them should provide for conveniently examining the map. A piece of transparent celluloid about twice the size of the map when folded can be made into a suitable cover. Fold the celluloid into an envelope form and rivet or sew the ends, leaving the fourth edge open. The map is inserted in the cover with the desired section uppermost, affording protection and ready access at the same time.

Shield for Heater in Chick Brooding House

A shield of sheet metal, having a small heater in the center of it, provides a good means of warming a brooding house for small chicks. The heat is radiated from the shield and the chicks remain at a distance, seeking a comfortable temperature. The device may be made easily by cutting a sheet of metal to form a cone-shaped hood and fitting it with a vent passing out through the roof of the house.—Samuel S. Snelbaker, York, Pa.

Kink for Removal of Wall Paper

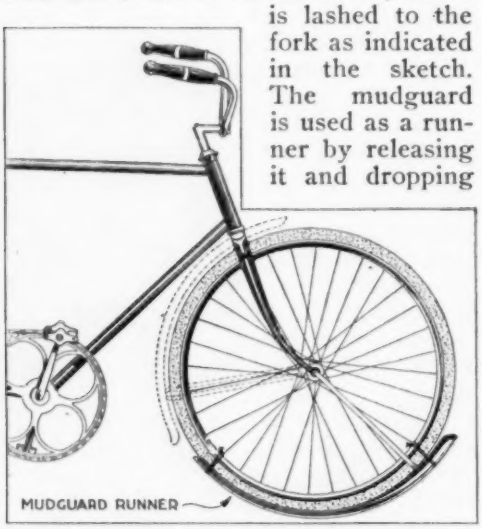
Removing old wall paper, particularly from the ceiling of a room, is a disagreeable task at best, and the device shown in the sketch aids in the process. A board, about 15 in. long and 12 in. wide, was provided with strips at its edges and a pad of flannel was fitted into it. The device is used by moistening the pad and applying it to the wall paper. The paper is loosened thoroughly and may be removed in pieces of considerable size. This method has been found much quicker than that of soaking the paper with a moistened brush.—J. H. Moore, Hamilton, Canada.



¶A clay pipe may be used as a crucible for melting small quantities of metal. The stem is broken off and a plug fitted into it.

Bicycle Runner for Winter Use

A bicycle may be used with satisfactory results in winter by arranging a runner under the front wheel, which is lashed to the fork as indicated in the sketch. The mudguard is used as a runner by releasing it and dropping

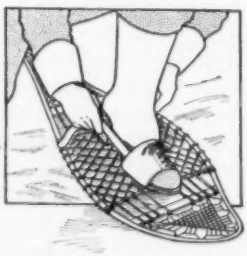


The Mudguard is Fastened to the Rim of the Wheel and Acts as a Runner over Ice and Snow

it to the position shown. It is then tied securely to the rim of the wheel and the wheel is tied at the top to the fork. This idea may be adapted by providing a special runner of sheet metal, making it unnecessary to wear the mudguard.—C. H. McCaslin, Portland, Ore.

Homemade Snowshoe Toe Clips

The uppers from a pair of worn-out shoes may be made into a serviceable set of toe clips for snowshoes by cut-



The Uppers of an Old Pair of Shoes were Used to Make a Set of Toe Clips for Snowshoes

ting them off, as shown in the sketch, and fitting them to the lacing of the snowshoes. The clip is fastened in place by passing the tying strap through slots in the former, under the lacing of the snowshoe, and then around the ankle in the usual manner of fastening.—Richard F. Lufkin, Dorchester, Mass.

Mounting Tracing-Cloth Drawings on Muslin

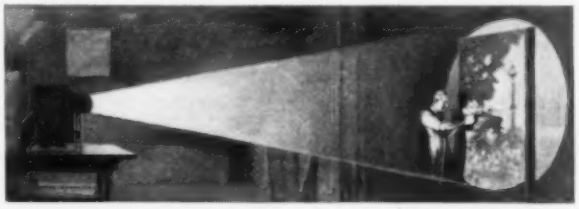
Tracings mounted on muslin will give long wear and are more satisfactory in handling than the unmounted drawings. The method of mounting them is as follows: Stretch a piece of starched muslin, slightly larger than the drawing, on a flat, smooth board, fastening it with tacks. Coat the back of the tracing with a good varnish, and place it, face down, on a flat surface so that it may partly dry and become tacky, which usually takes two hours. Place the tracing upon the stretched muslin, varnished side down, and place a smooth sheet of wrapping paper over it. Using a moderately warm flatiron, and beginning at the center of the tracing, iron toward the edges, applying moderate pressure. To remove the tracing from the cloth, it is necessary to warm the cloth with the iron and strip the tracing and cloth apart gradually.—John W. Grantland, Cincinnati, Ohio.

Sandpapering Square Edges on Small Machine Bases

The woodwork of small electrical or experimental machines and devices often detracts from the workmanship because proper care is not taken in finishing the edges. To smooth off the ends of a small baseboard squarely, proceed as follows: Square up a piece of 2 by 4-in. stock, 1 ft. long; place a flat sheet of sandpaper on the bench and set the 1-ft. block on top of it, holding it in place with the left hand. Hold the piece to be squared up firmly against the block and rub it on the sandpaper. A square edge of smooth finish will result. The edges should, of course, be planed as smoothly as possible before sanding in this way.—John D. Adams, Phoenix, Ariz.

Enlarged Lantern Pictures as Guides for Scenic Painting

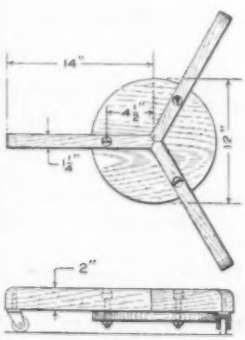
Scenery for a home-talent theatrical performance was required, and since the services of an expert in that line were not available, an interesting method of obtaining satisfactory sketches for the figures and other objects in the background was devised. Colored lantern slides of scenes suitable for the purpose were selected and projected upon the canvas to be painted, as shown in the illustration. The outlines were drawn around the projected figures, making them as accurate as the original, and far better than would have been possible otherwise by an amateur painter. The colors were applied following the original model, with satisfactory results. By the use of various portions of slides, it was possible to place figures and outdoor effects on the background which was obtained from the first slide used. A factor which must be considered in using this method is that the picture on the canvas will be reversed as to right and left positions compared with the original, if a direct-reflection projector of the type used with post cards is employed.—Thomas R. Milligan, Fort Worth, Texas.



Scenery for an Amateur Theatrical Performance was Made by Painting Outlines Projected from a Lantern

Three-Caster Truck for Moving Crates and Furniture

A convenient truck for handling heavy objects, especially in the home where commercial devices for this purpose are not available, is shown in the illustration. It consists of a frame built up of three 1¼ by 2 by 14-in. strips, fixed to a disk, ⅞ by 12 in. in size. Revolving casters are mounted under the ends of the arms, giving great freedom of movement in transporting loads. The three-caster arrangement is better than the use of four casters, because it accommodates itself to irregularities in the floor.—Armydas E. Sturdivant, Muncie, Ind.



¶The burner of an acetylene bicycle lamp, fitted to an ordinary gas jet, will produce a very hot flame.

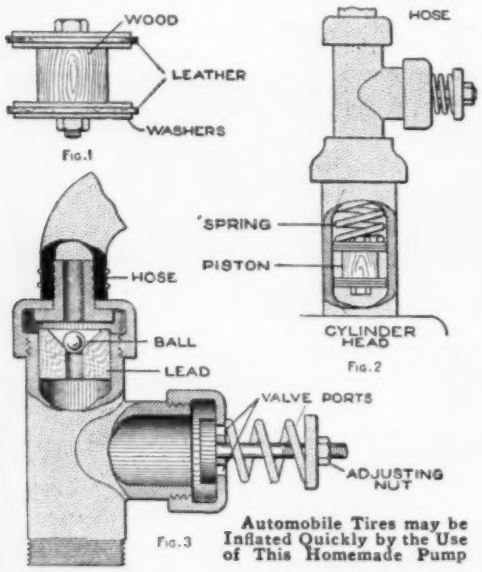
Inserting or Correcting on Typewritten Bound Sheets

It is frequently necessary that typewritten insertions or corrections be made in papers which have been typed and bound, usually by rivets along the top edge. It is difficult to remove the rivets and replace them satisfactorily. To make such insertions, feed a blank sheet of paper into the typewriter until its feeding edge is even with the upper edge of the guide fingers. Then insert the bottom edge of the sheet on which the correction is to be made, underneath the sheet already in the machine; reverse-feed the sheet to be corrected into the typewriter. Corrections may then be made in the usual manner.—A. J. Cook, Pittsburgh, Pa.

Tire Pump Made of Gas Piping

A tire pump actuated by the explosions in the cylinder of an automobile engine, and made of materials easily obtainable, is shown in detail in the illustration. A section of iron pipe of a diameter to fit one of the ports, and about 4 in. long, as shown in Fig. 2,

is provided with a reducer, a tee, and two caps. The inside of the pipe is turned up true in a lathe and fitted with a piston, the head for which is



Automobile Tires may be Inflated Quickly by the Use of This Homemade Pump

shown in Fig. 1. The head is built up of a wooden drum, washers, and leather packing disks. The washers should be slightly smaller in diameter than the chamber, and the leather disks make it air-tight.

The tee is provided with two valves, as shown in the detail sectional view, Fig. 3, the upper ball valve retaining the pressure in the pipe line, and the other valve admitting air above the piston. The ball valve has a seat of lead, and a ribbed fitting is fixed to the pipe cap above it, to provide a fastening for the hose. The cap of the other valve is fitted with a spring, adjustable on a threaded pin.

A light spring fixed to the upper side of the piston, as shown in Fig. 2, forces the piston back to its lower position after the force of the explosion in the cylinder has acted upon it. The cylinder of the pump should be oiled, and a reinforced rubber hose should be used to conduct the air under pressure to the tire.

The operation is simple: The initial stroke of the engine cylinder draws the piston down, bringing in a charge of air from the valve ports at the side of the tee; the following compression and explosion strokes drive it back, forcing the air out of the ball valve, as the other valve closes on the upstroke of the piston. A large tire may be pumped up with this device in from five to ten minutes.

Aid in Ruling Uniform Cards or Sheets

When a number of cards or sheets are to be ruled with either horizontal or vertical divisions, the following method will be found a timesaver: Rule one of the cards as a sample. Place it on the drawing board with its lower edge set against two thumb tacks driven part way in. Rule extensions of the lines on the card to a sheet of paper fastened to the board under the card. Set a third thumb tack at the right edge of the card as a guide. By placing the cards to be ruled against the three thumb tacks in the position of the original card, the rulings may be made quickly with the marks on the paper backing as guides.—W. P. Shaw, Stratford, Can.

Tinned Staples for Bell-Circuit Wiring

Inexpensive and practical staples for binding wires used in bell circuits, or for similar purposes, may be made from a strip of tinned sheet metal, about ½ in. wide. The strip is cut on the sides, as indicated in the sketch, and the squares are broken off as needed. They may be bent quickly to the shape shown, and are used by placing them over the wire and driving the

The Strip is Cut into Squares Which are Folded and Driven into the Support, Binding the Wire

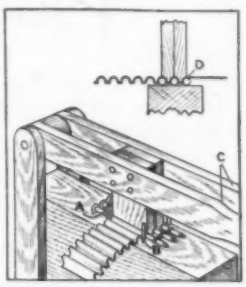
points into the wall or other support. If properly made, they will not injure the covering of the wire and are more satisfactory than wire staples.

Asbestos Table Mats Reinforced with Wire Netting

Ordinarily heavy pieces of sheet asbestos are used for the mats placed under hot dishes on the dining table. These are easily broken if bent, and a simple method of overcoming this breakage is to make mats as follows: Cut two pieces of sheet asbestos, each about one-half the thickness of that usually used, one having about ¾ in. around the edge which may be used as a binder in pasting the sheets together. Cut notches into this edge, at intervals of about 2 in., and insert a disk of wire window screening between the pieces of asbestos. Turn the edges of the larger piece over and paste in place.

Device for Corrugating Strips

Having a sheet-metal cog rail to make for the adjusting mechanism of an enlarging screen, I built a cog-forming device as shown in the sketch. A block of wood served as the base, and two levers with hinges were fixed to one end of it. Two pieces of hardwood were grooved at their ends as shown in the smaller sketch, to fit over three tenpenny nails, A, held in place on the block by staples. Four small nails, B, were set into the block, as shown, to act as guides for the strip of metal, which was fed between the forming blocks and the nails on the base. By pressing down on the hinge levers, the strip was formed into corrugations or teeth. In order to make the teeth uniform it was necessary to guide the forming pieces by having one of the cogs fit over the first nail. The strip thus formed was fixed to a wooden piece and served as a cog rail. —R. E. Henderson, Walla Walla, Washington.

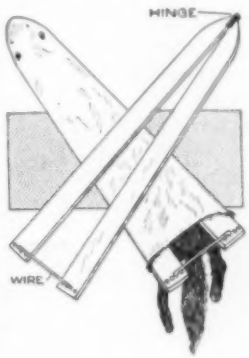


Birch-Bark Leggings Made in the Woods

An excellent pair of leggings for use in brush and forest land can be made in a few minutes from birch bark cut in the woods. Select a suitable tree, about 6 or 8 in. in diameter, and cut into the heavy bark to obtain two rolls around the circumference of the tree, taking care not to cut deep enough to injure it. Fit these sections around the legs leaving 6-in. portions overlapping. Trim the bark to the proper shape and soak it in water to soften the grain. Place the bark close to the fire until it curls. The leggings are then ready for use.

Stretcher for Drying Small Fur Hides

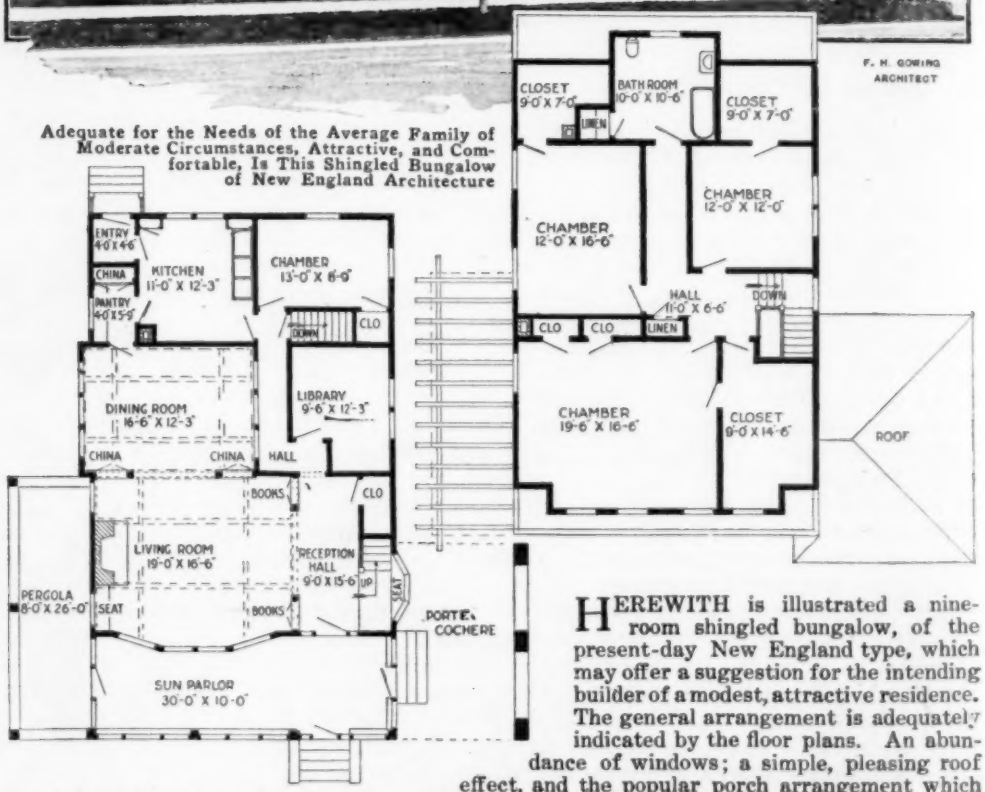
Small hides should be dried over a stretcher to give the best results, and the device shown in the sketch will be found useful for this purpose. It is made of two strips of ½-in. wood, hinged at the pointed end. Small holes are drilled into the upper surface at the other ends and adjustment is made by means of a wire bent at the ends and inserted in the holes.—Elmer Tetzlaff, East DePere, Wis.



¶Wire mesh is useful for drawer bottoms in tool cases where dirt is likely to accumulate.

COMFORTABLE, PLEASING SHINGLED BUNGALOW

Adequate for the Needs of the Average Family of Moderate Circumstances, Attractive, and Comfortable, Is This Shingled Bungalow of New England Architecture



HEREWITH is illustrated a nine-room shingled bungalow, of the present-day New England type, which may offer a suggestion for the intending builder of a modest, attractive residence. The general arrangement is adequately indicated by the floor plans. An abundance of windows; a simple, pleasing roof effect, and the popular porch arrangement which provides a glazed sun parlor in winter and a screened, open veranda in summer, are some of its outstanding points. At one end of the porch is a pergola, 8 by 26 ft. in size, while at the other end a large porte-cochère spans the driveway. This plan gives breadth and architectural charm to the exterior. Dormer windows solve the ceiling problem for the big bedchamber on the second floor and also add needed height to the front of the house. The sloping roof is responsible for the apparently enormous size of the closets, which, it will be observed, are placed in the corners where waste space cannot otherwise be utilized. This bungalow can be built for approximately $5,000.